

# Service

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Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used

# Service Manual

## GB SPECIFICATION

Microprocessor	: Z80A
Memory	: 48k ROM
	16k disk ROM
	128k video RAM
	128k user RAM
Video processor	: V9938
MSX controller	: S-3527
Floppy-disk drive	: 2x3.5", 1 MB
Interfaces	: RF output (UHF channel E36) VIDEO/AUDIO output VIDEO/AUDIO input SCART Cassette recorder 2 joysticks Printer 2 cartridge slots
Keyboard	: QWERTY /00/16
Power supply voltage	: 220V ± 10%, 50Hz

## NL SPECIFICATIE

Microprocessor	: Z80A
Geheugen	: 48k ROM
	16k disk ROM
	128k video RAM
	128k gebruikers RAM
Videoprocessor	: V9938
MSX controller	: S-3527
Floppy-disk drive	: 2x3.5", 1 MB
Interfaces	: RF uitgang (UHF kanaal E36) VIDEO/AUDIO uitgang VIDEO/AUDIO ingang SCART Cassette recorder 2 handbedieningen Printer 2 cartridge sleuven
Toetsenbord	: QWERTY /00/16
Voedingsspanning	: 220V ± 10%, 50Hz

## F CARACTÉRISTIQUES TECHNIQUES

Micro processeur	: Z80A
Mémoire	: 48k ROM
	16k ROM à disque
	128k RAM vidéo
	128k RAM utilisateur
Processeur vidéo	: V9938
Contrôle MSX	: S-3527
Lecteur de disquette	: 2x3.5", 1 MB
Interfaces	: Sortie RF (Canal UHF E36) Sortie VIDEO/AUDIO Entrée VIDEO/AUDIO SCART Magnétophone cassette 2 poignées Imprimante 2 "slots" cartouche
Clavier	: QWERTY /00/16
Tension d'alimentation	: 220V ± 10%, 50Hz

## D TECHNISCHE DATEN

Mikroprozessor	: Z80A
Speicher	: 48k ROM
	16k Disk-ROM
	128k Video-RAM
	128k Gebrauchers-RAM
Videoprozessor	: V9938
MSX-Steueranheit	: S-3527
Floppy Disk-Laufwerk	: 2x3.5", 1 MB
Schnittstellen	: RF Ausgang (UHF Kanal E36) VIDEO/AUDIO-Ausgang VIDEO/AUDIO-Eingang SCART Cassettenrecorder 2 Handbedienungen Drucker 2 Kassettenschlüsse
Tastatur	: QWERTY /00/16
Versorgungsspannung	: 220V ± 10%, 50 Hz

## I DATA TECNICI

Microprocessore	: Z80A
Memoria	: 48k ROM
	16k ROM a disco
	128k RAM video
	128k RAM utilizzatori
Processore video	: V9938
MSX di controllo	: S-3527
Lettore di dischetto	: 2x3.5", 1 MB
Interfacce	: Uscita RF (Canale UHF E36) Uscita VIDEO/AUDIO Entrata VIDEO/AUDIO SCART Registratore a cassetta 2 leve manuali Stampa 2 connettori per cartuccia
Tastiera	: QWERTY /00/16
Tensione d'aliment.	: 220V ± 10%, 50 Hz

Documentation Technique Service Dokumentation Documentazione di Servizio Huolte-Ohje Manual de Servicio Manual de Servicio



Pour votre sécurité, ces documents doivent être utilisés par des spécialistes agréés, seuls habilités à réparer votre appareil en panne.

Subject to modification

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**PHILIPS**

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CS 9 254

**CAUTION**

1. The exchange of cartridges should take place with the set turned off.

## 2. ESD



All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools also at this potential.

**ALIGNMENTS****RTC clock frequency**

- Connect a frequency meter via a 10:1 probe to test point TP107 and connect the mass terminal of the probe with test point TP111.
- Set the frequency on TP107 to 32.768 kHz by means of VC101.

**FDC****1. Read-pulse width**

- Connect TP108 with TP109.
- Connect an oscilloscope via a 10:1 probe with TP106 and connect the mass terminal of the probe with TP109.
- Adjust the pulse width on TP106 for 0.5  $\mu$ s by means of VR102, see figure 1.
- Interrupt the connection between TP108 and TP109.

**2. VCO frequency**

- Connect a frequency meter via a 10:1 probe to TP102 and connect the mass terminal of the probe with TP109.
- Switch the computer on.
- Connect TP108 with TP109.
- Using VR104, set the frequency on TP102 to 250 kHz.
- Interrupt the connection between TP108 and TP109.

**Analog Unit****1. Clock adjustment**

- Connect via a 10:1 probe a frequency meter to TP309 and connect the ground of the probe with TP316 (GND).
- Connect via a 10:1 probe an oscilloscope to TP308 and connect the ground of the probe to TP314 (GND).
- Displace the video mix slide to the graphics mode.
- Adjust VC301 for a frequency of 3,554,688  $\pm$  20 Hz on TP309.
- Adjust VC302 for a voltage of 1,2  $\pm$  0,1 V on TP308 (see figure 2).
- Check once again if the frequency at TP309 is 3,554,688  $\pm$  20 Hz.

**2. Burst frequency**

- Connect via a 10:1 probe a frequency meter to TP310 and connect the ground of the probe to TP316 (GND).
- Displace the video mix slide to the graphics mode.
- Adjust VR306 for a frequency of 4,443,619  $\pm$  20 Hz on TP310.
- Displace the video mix slide to the "EXT" mode.
- Check once again if the frequency at TP310 is 4,443,619  $\pm$  20 Hz.

**3. Burst position**

- Connect via a 10:1 probe an oscilloscope to the video input of the modulator (pin 3) and connect the ground of the probe to TP316 (GND).
- Displace the video mix slide to the graphics mode.
- Adjust VR304 for a period time T1 (see Fig. 3) of 5  $\pm$  0,2 ms.

**4. PAL delay line**

- 4a. - Connect the TV pattern generator (PM5515) to the video input of the computer.
- Switch the pattern generator to the "DEM" mode.
- Displace the video mix slide to the "EXT" mode.
- 4b. Amplitude error.
- Adjust by means of VR303 the picture so that venetian blinds do not occur in the first two blocks of field 3 (Fig. 4).
- 4c. Phase error.
- Adjust by means of T303 the picture so that venetian blinds do not occur in the third and fourth block of field 3 and in the first block of field 1.

**5. Phase subcarrier**

- First perform the above-mentioned point 4a.
- Adjust by means of VR305 the picture so that all four blocks of field 3 (see Fig. 4) become grey.

**6. Video signal level**

- Connect via a 10:1 probe an oscilloscope to TP303 and connect the ground to TP316 (GND).
- Connect the TV pattern generator (PM5515) to the video input of the computer.
- Switch the pattern generator to the "Colour bar" mode.
- Displace the digitize level slide until amplitude A (see Fig. 5) on TP303 becomes 1  $\pm$  0,05 Vpp.
- Adjust VR302 for an equal amplitude level of B, C and D (see Fig. 5).

**7. Video mix level**

- 7a. - Connect via a 10:1 probe channel 1 of an oscilloscope to TP312 and connect the ground to TP314 (GND).
- Connect via a 10:1 probe channel 2 of an oscilloscope to TP311.
- Displace the video mix slide to the graphics mode.
- 7b. - Perform the following BASIC command : COLOR 14,15,15
- Adjust VR307 until the amplitudes of the signals on TP312 and TP311 become equal.
- Connect via a 10:1 probe channel 2 of the oscilloscope to TP313.
- Adjust VR308 until the amplitudes of the signals on TP312 and TP313 become equal.
- 7c. - Displace the video mix slide until the amplitude of the signal on TP312 becomes 0,4  $\pm$  0,02 Vpp.
- Adjust VR310 until the amplitudes of the signals on TP312 and TP313 become equal.
- Connect via a 10:1 probe channel 2 of the oscilloscope to TP311.
- Adjust VR309 until the amplitudes of the signals on TP312 and TP311 become equal.

## Floppy Disk Drive

### 1. Required measuring equipment

- Dual trace oscilloscope, for example PM3211.
- Alignment disk, code number 4822 395 30274.
- FDD test cartridge, code number 4822 397 30171.

### 2. Use of the FDD test cartridge

- Switch the computer off and insert the FDD cartridge.
- Switch the computer on again.
- Type: "CALL FDDTEST" and press the <RETURN> key.
- Select the disk drive test.
- The functions in the disk drive test are used for adjusting the disk drive.

### 3. Radial alignment

- A) - Connect channel A of the oscilloscope via a 10:1 probe with test point TPN (for a survey of the test points, see figure 6.)
  - Connect channel B via a 10:1 probe with test point TPP.
  - Connect the mass terminal of the probe with GND.
  - Oscilloscope alignments
    - Trigger externally with the index signal (IC140 pin 13 in the computer)
    - Sensitivity time basis: 20 ms/div.
    - Sensitivity channel A and channel B: 5mV/div.
    - Invert channel B.
    - Add channel A and channel B.
- B) - Place the alignment disk in the drive and read continuously track 40, side 0 (with <F3>).
  - Check that the cat's eye pattern (see figure 7) is visible on track 40.
  - If the correct cat's eye pattern is not visible, stop the reading action (with <ESC>).
  - Loosen the screws A (see figure 6) of the stepping motor a quarter turn.
  - Read track 40, side 0 continuously (with <F3>).
  - Rotate the stepping motor (by means of a screwdriver in alignment point B, see fig. 6) until all lobes of the cat's eye pattern have the same amplitude.
  - Tighten the screws A of the stepping motor again and check the cat's eye pattern once more. Repeat the alignment, if necessary.
  - Stop the reading action with <ESC>.
  - Read track 00, side 0 continuously (with <F3>) and increase the track number with the <CURSOR UP> key to track 40. Check the cat's eye pattern again.
  - Stop the reading action (with <ESC>).
  - Read track 79, side 0 continuously (with <F3>) and lower the track number to track 40 with the <CURSOR DOWN> key. Check the cat's eye pattern again.

### 4. Alignment track 00 sensor

#### Method 1

- Carry out point A of the radial alignment, however with the sensitivity of the time base at 5  $\mu$ s/div.
- Place the alignment disk in the drive and read continuously track 00, side 0 (with <F3>).
- Check whether a 62.5 kHz signal (a '1' data pattern) is present on track 00.
- If the signal is not present, adjust the track 00 sensor until the 62.5 kHz signal will be visible.
- Check if the 62.5 kHz signal is only present on track 00 and not on track 01.

#### Method 2

- First check the radial alignment.
- Connect the input of the oscilloscope with test point TPT and ground.
- Read track 00, side 0 (with <F3>).
- Increase the track number to track 02 (with the <CURSOR UP> key) and measure the voltages across the track 00 sensor. These voltages should be:
  - 4.5V on track 00
  - 4.5V on track 01
  - 0 V on track 02
- If the measured values do not correspond with the values given above, decrease the track number by 1 to track 01.
- Adjust the track 00 sensor until the voltage across the sensor is 4.5 V at track 01.
- Check the voltages across the sensor at track 00, track 01 and track 02.
- Step to track 02 and lower the track number to track 00. Meanwhile check the voltage across the track 00 sensor at track 02, track 01 and track 00.

### 5. Azimuth inspection

- Carry out point A of the radial alignment, however with the sensitivity of the time base at 0.5 ms/div.
- Place the alignment disk in the drive and read continuously track 40, side 0 (with <F3>).
- Check the azimuth burst wave pattern (see figure 8).
- A tolerance of  $\pm 30^\circ$  is allowed. Greater deviations may cause compatibility problems. The head unit cannot be adjusted further.

### 6. Index burst alignment

- Connect channel A of the oscilloscope via a 10:1 probe with test point TPN.
- Connect channel B via a 10:1 probe with the index signal (IC140 pin 13 in the computer).
- Connect the mass terminal of the probe, connected to channel A, with GND.
- Oscilloscope alignments:
  - Trigger on channel B.
  - Sensitivity time base: 0.1 ms/div.
  - Sensitivity channel A: 2 mV/div.
  - Sensitivity channel B: 0.2V/div.
- Insert the alignment disk in the floppy drive and read track 40, side 0 continuously (with <F3>).
- Adjust VR2 for a period time T (see figure 9) of  $400 \pm 200 \mu$ s.

### 7. Side 1

- Check alignments 3 to 6 for side 1.

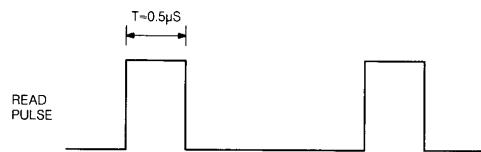


Fig. 1

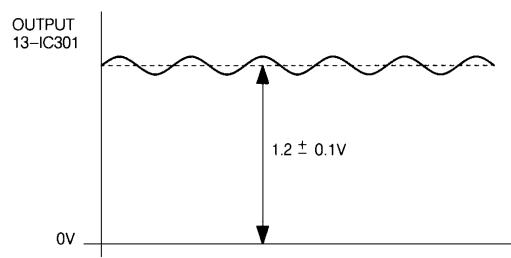


Fig. 2

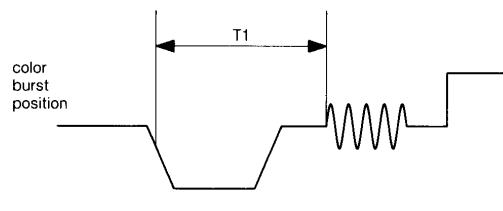


Fig. 3

FIELD	G-Y=0		Y=50%	
	1)	2)	1)	2)
1	+(R-Y)	-(R-Y)	+(B-Y)	-(B-Y)
2	+(R-Y)	-(R-Y)	+(B-Y)	-(B-Y)
3	+(R-Y)	-(R-Y)	+(B-Y)	-(B-Y)
4	Y=50%			

1)  $B-Y=0$   
2)  $R-Y=0$

Fig. 4

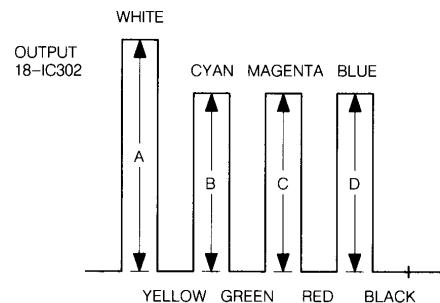


Fig. 5

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T28/722

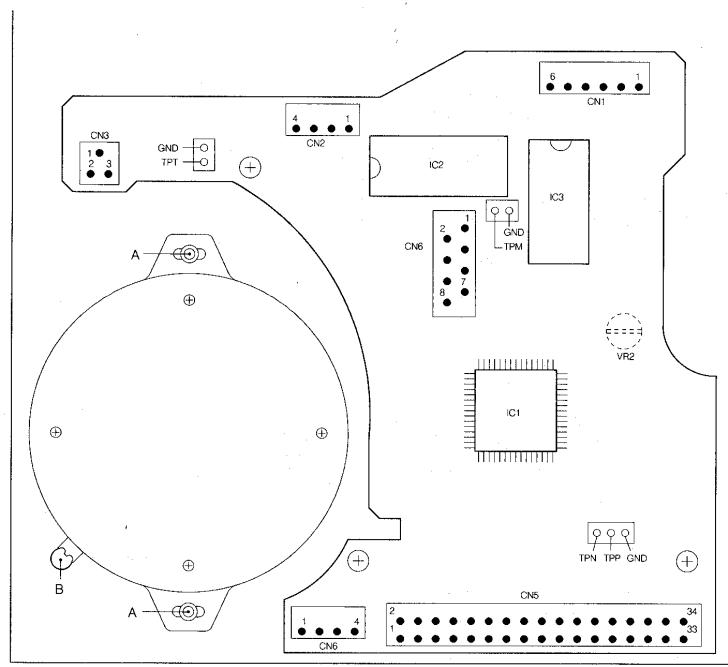
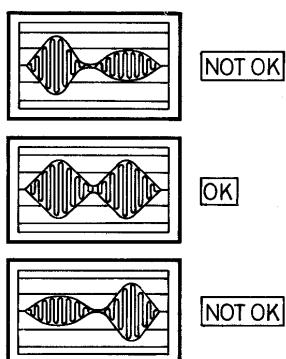


Fig. 6



39 578 A12

Fig. 7

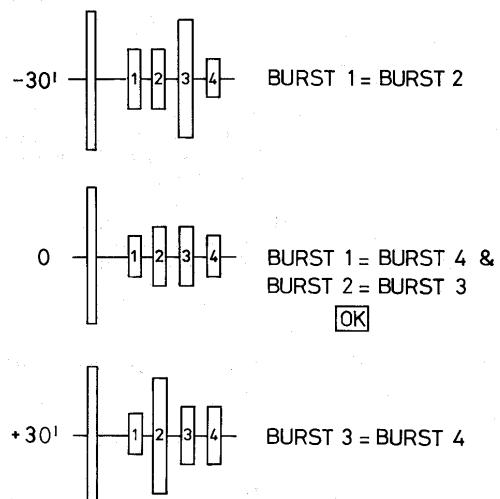


Fig. 8

39 580 A12

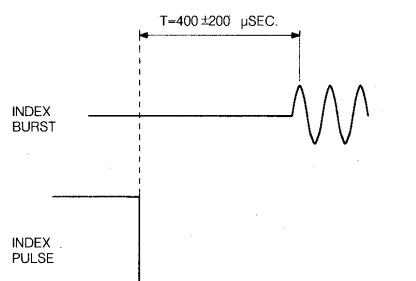
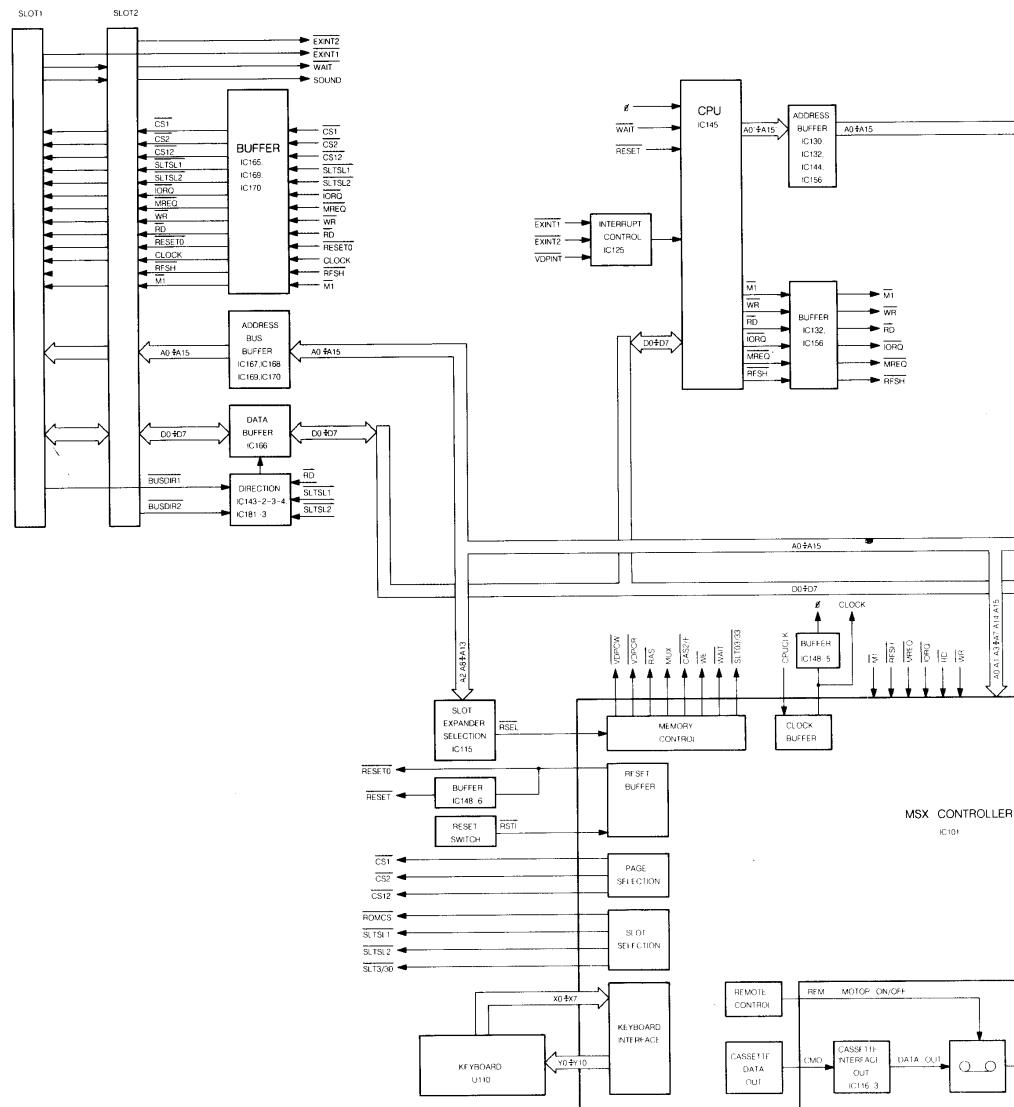


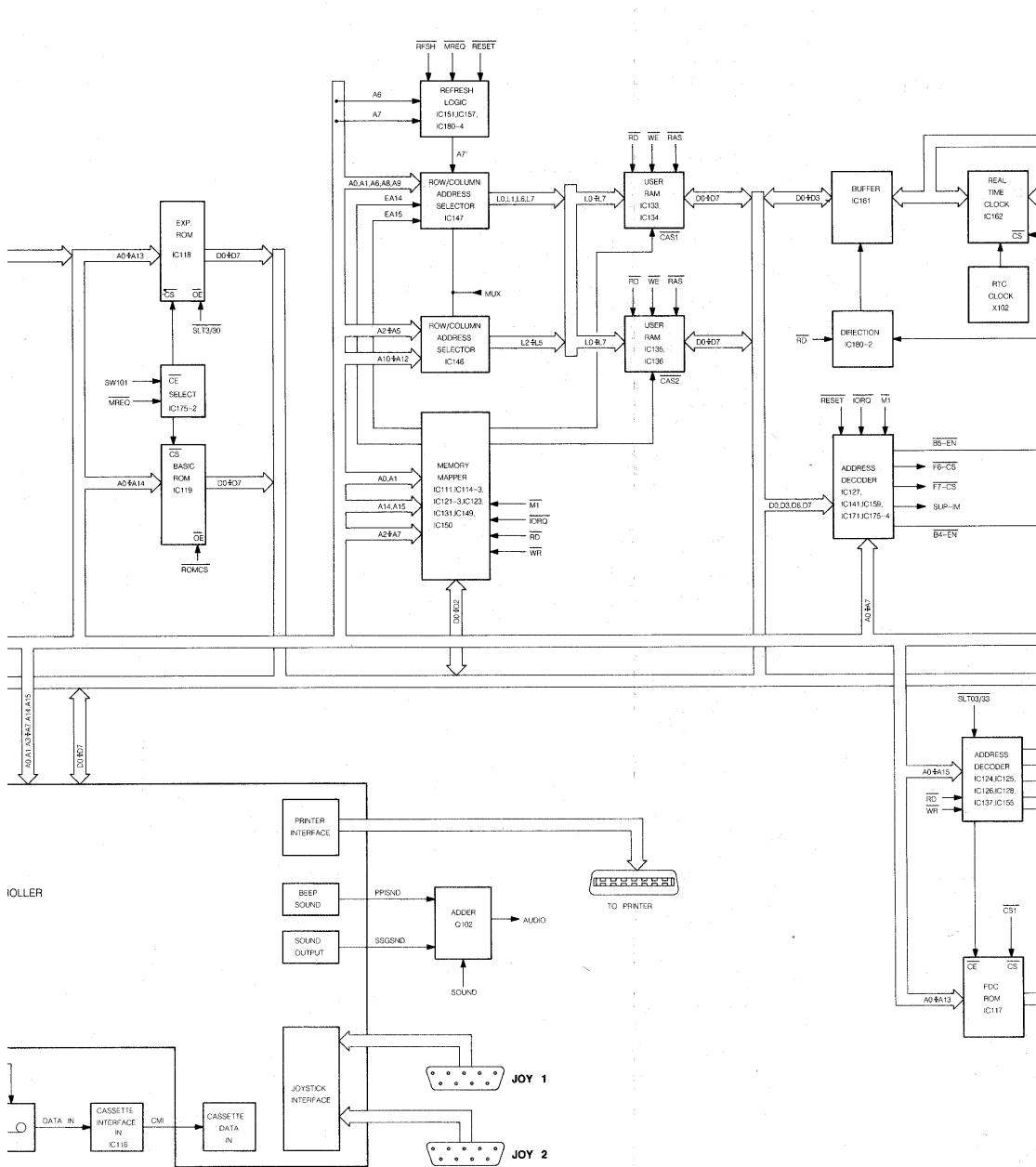
Fig. 9

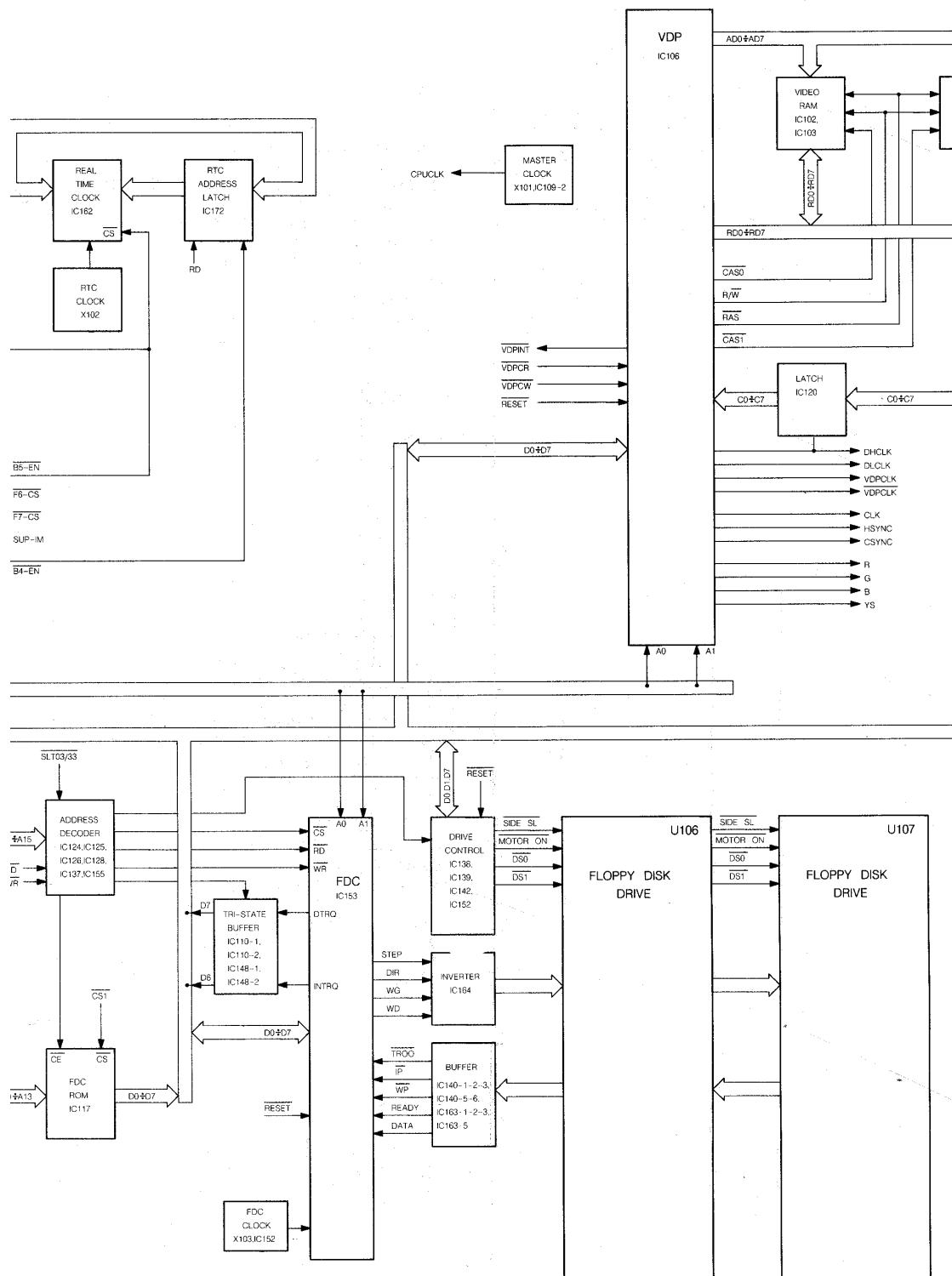
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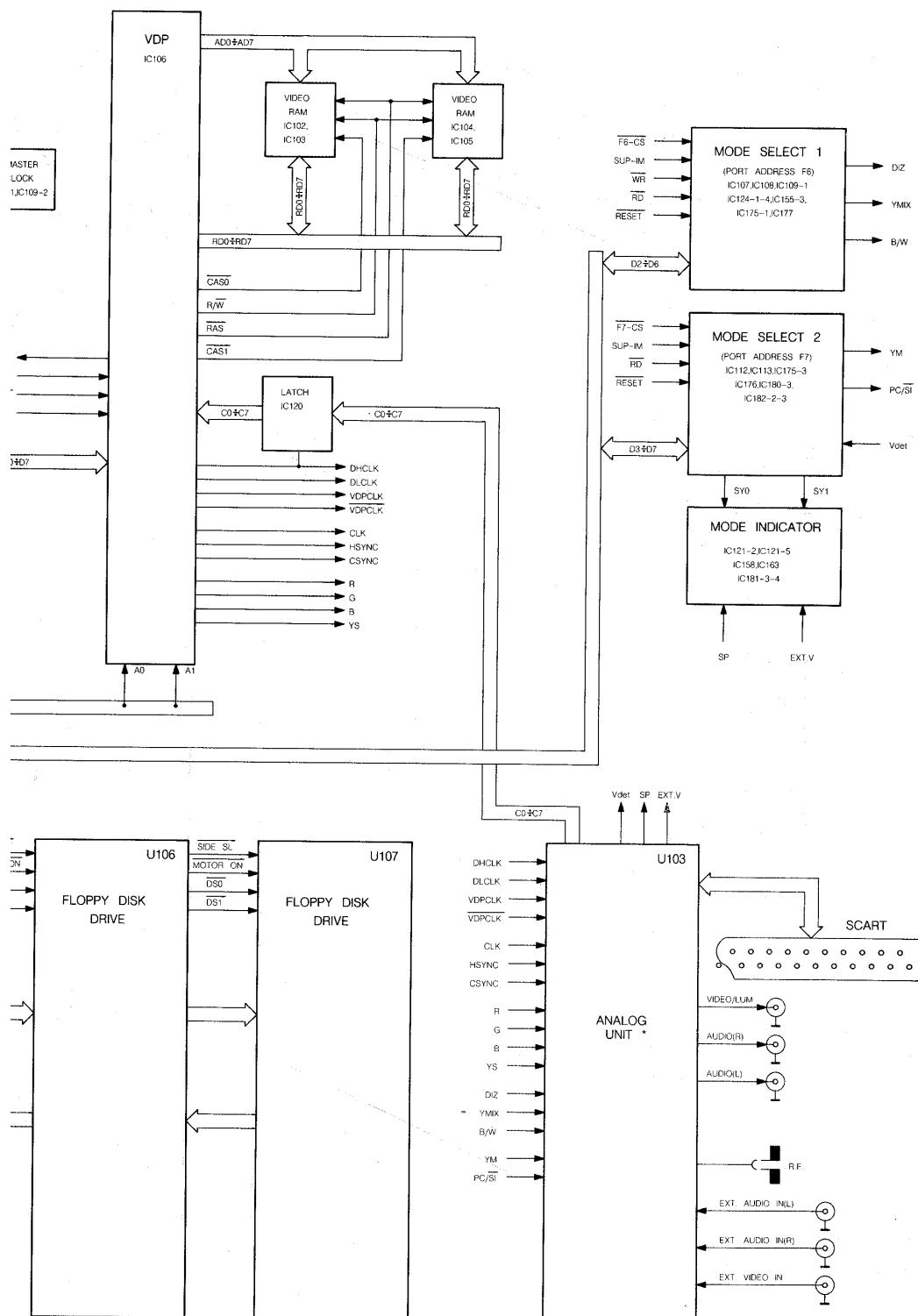
## FUNCTIONAL DIAGRAM



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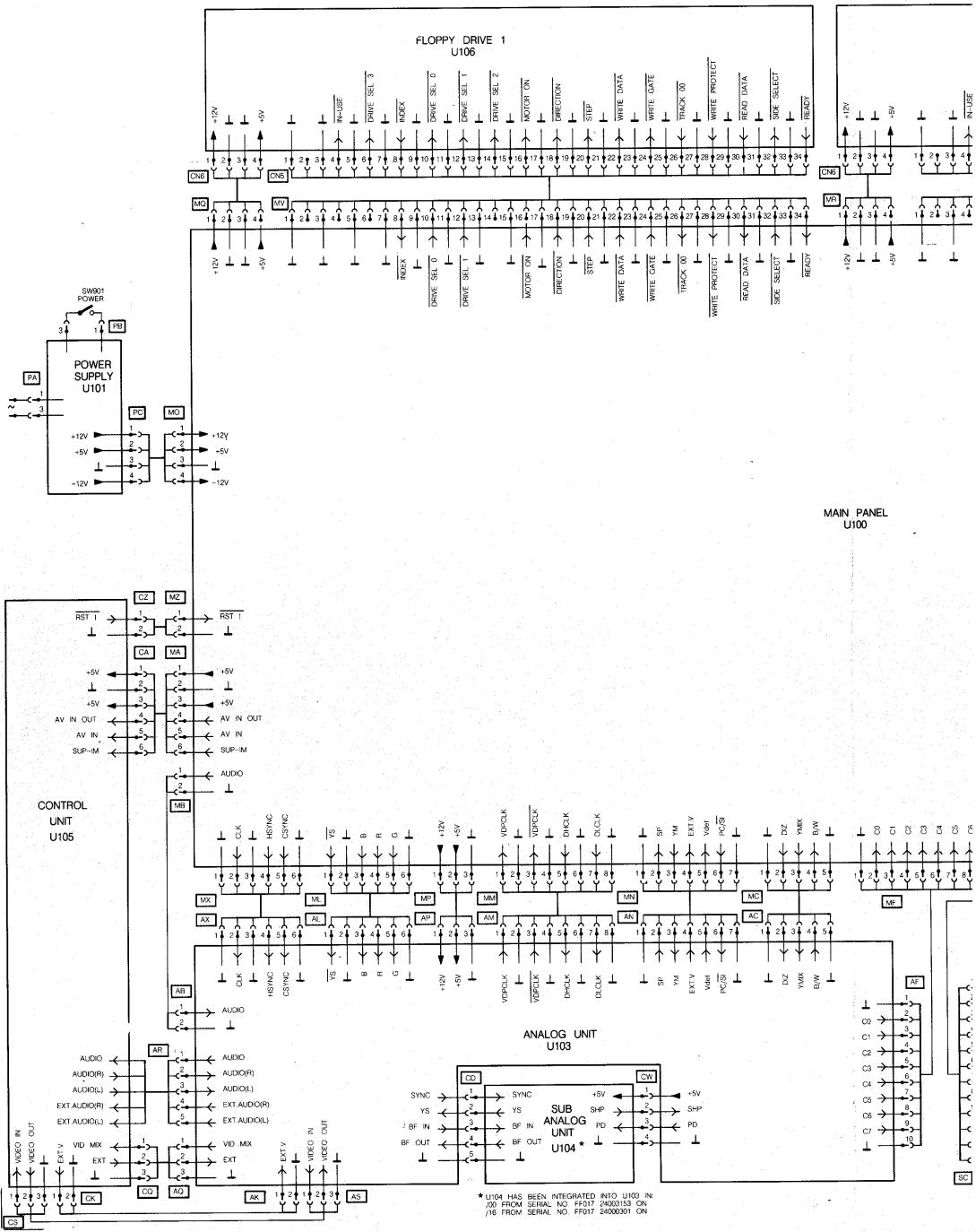




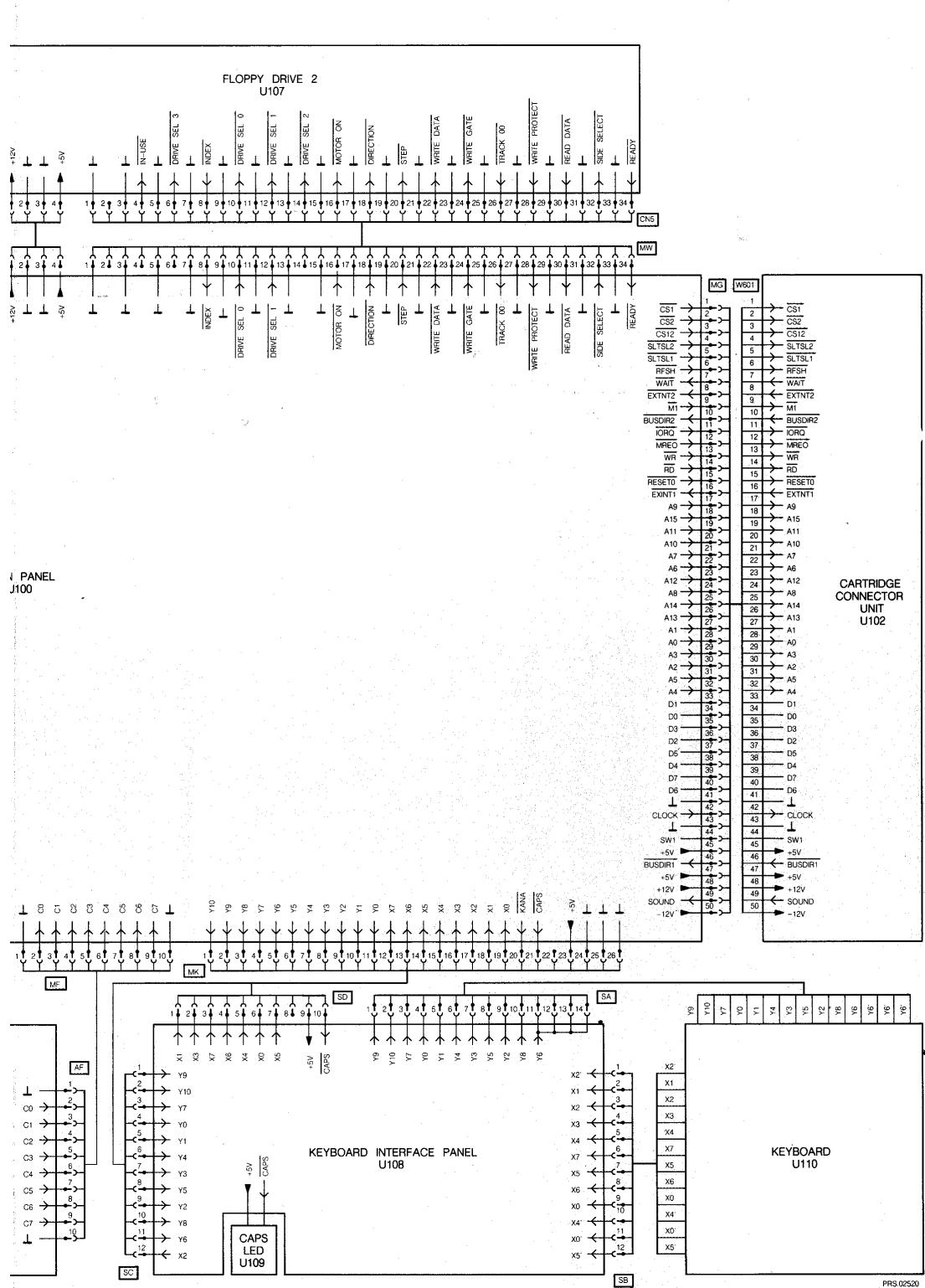
SEE ALSO: FUNCTIONAL DIAGRAM ANALOG UNIT

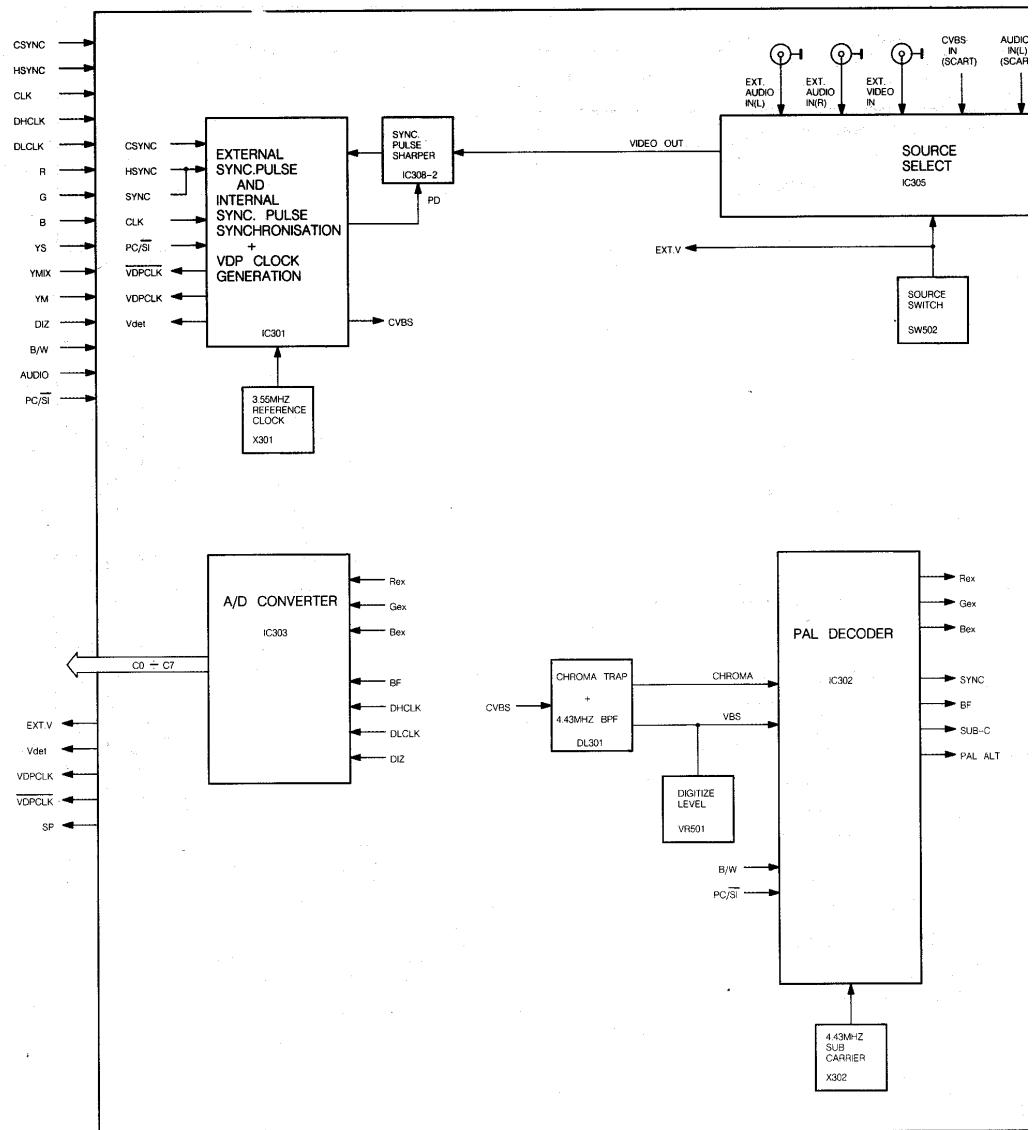
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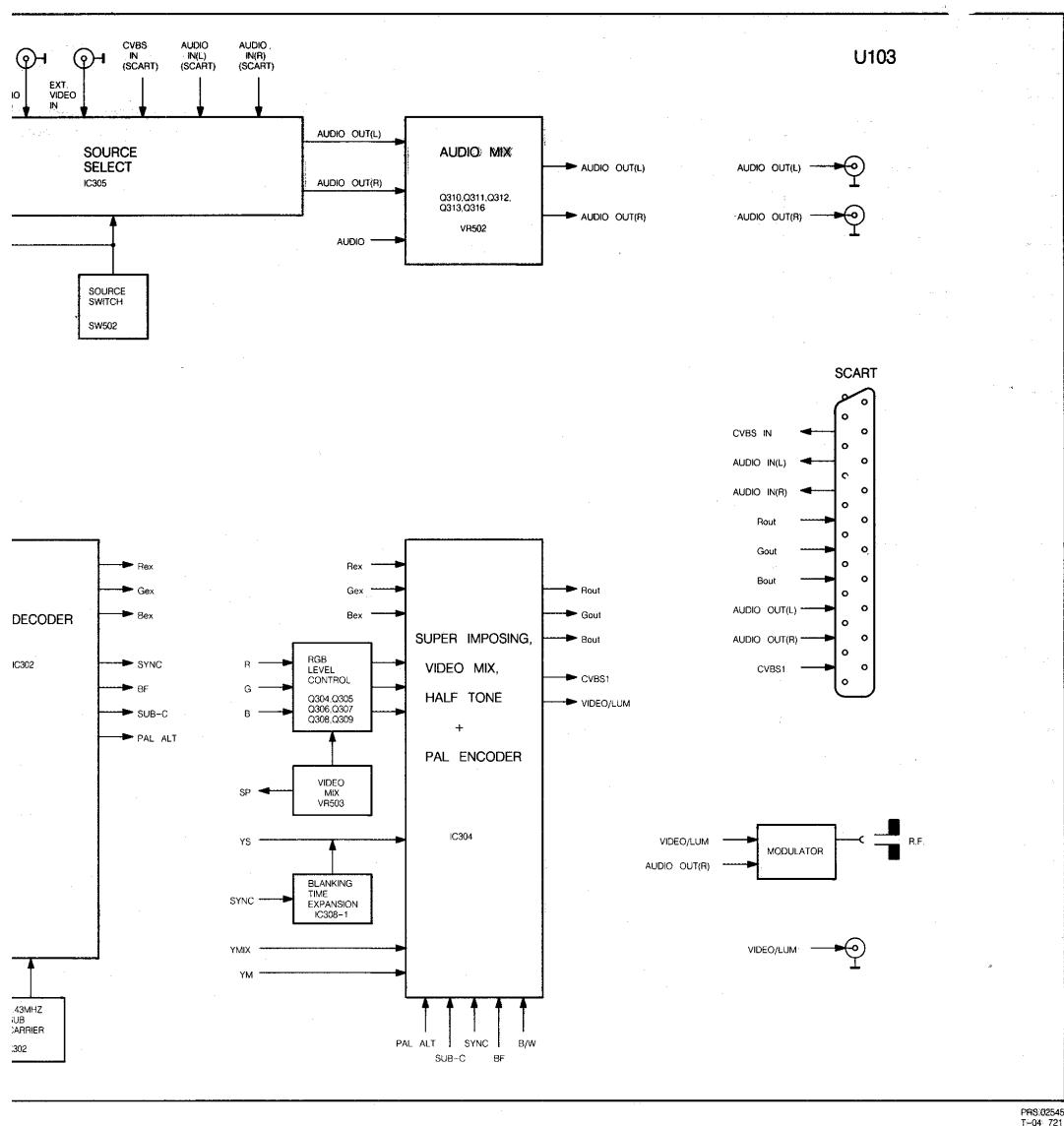
WIRING DIAGRAM



CS 9 267





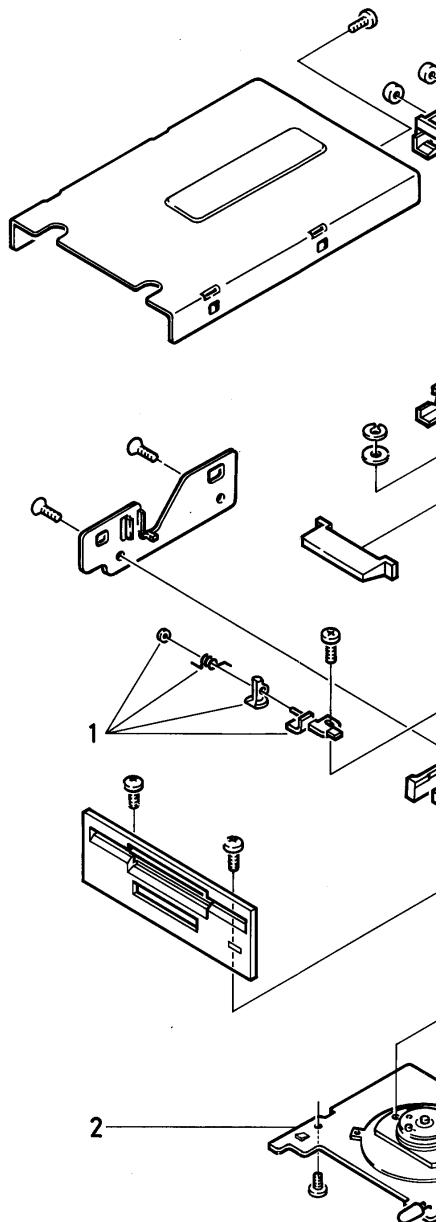


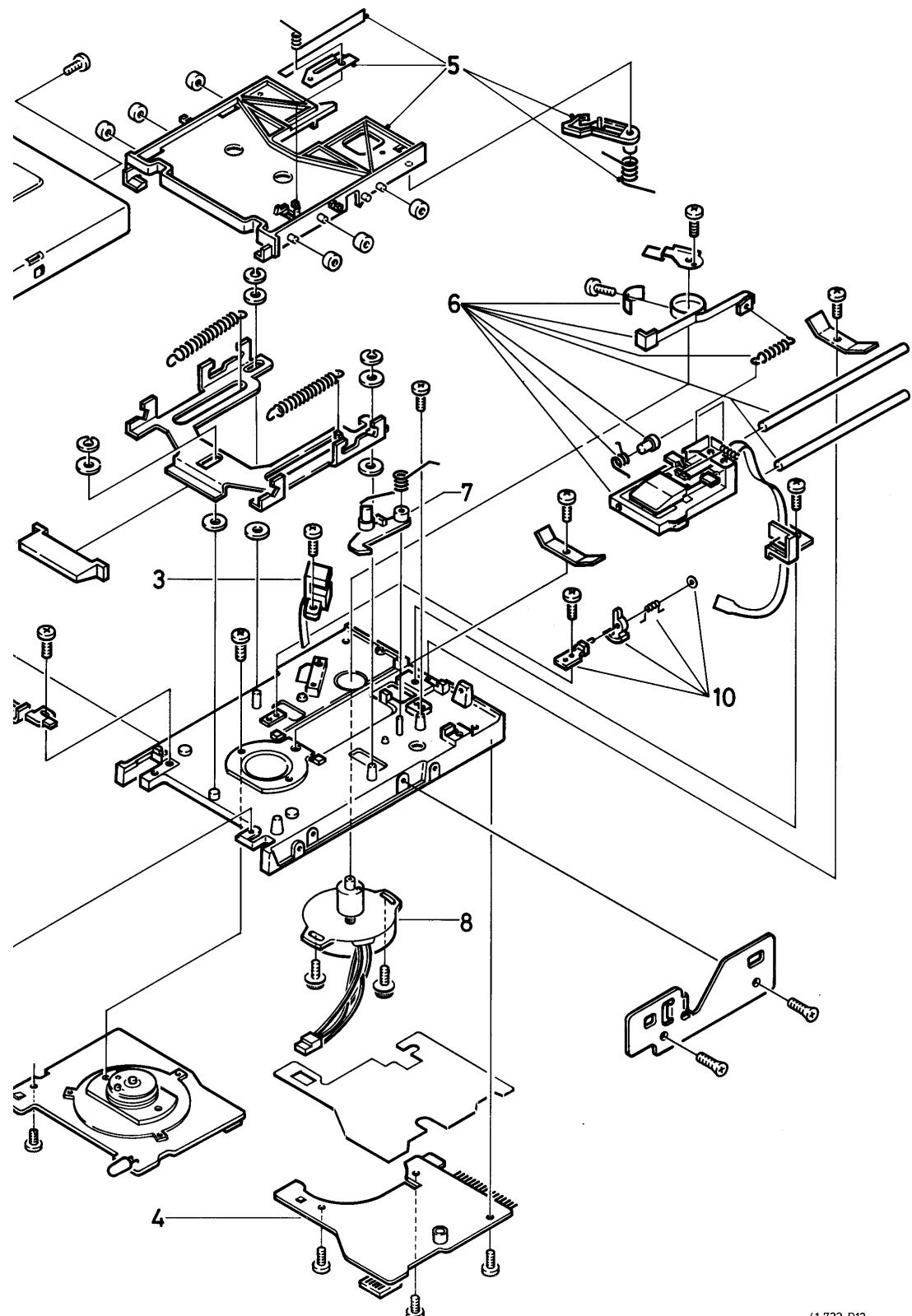
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EXPLODED VIEW FDD

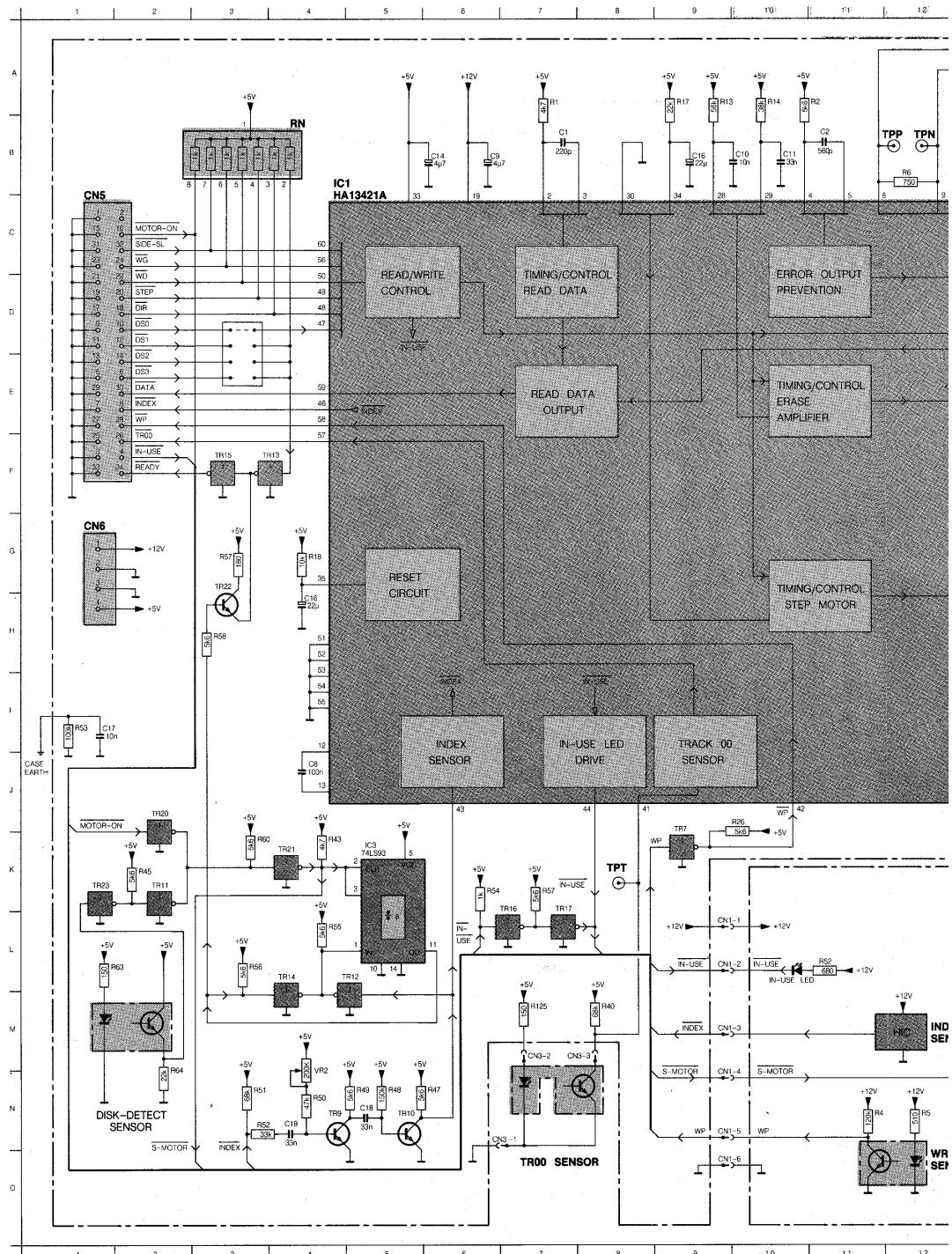
FDD PARTS LIST

1	4822 277 10978	Write protect switch assy
2	4822 212 22744	Spindle motor + PCB
3	4822 130 10011	Track 00 sensor
4	4822 212 22743	Complete printed board
5	4822 404 60381	Disk holder assy
6	4822 693 91126	Carriage assy
7	4822 404 60382	Eject hook bracket
8	4822 361 30236	Stepper motor
10	4822 277 10979	Disk detect switch assy

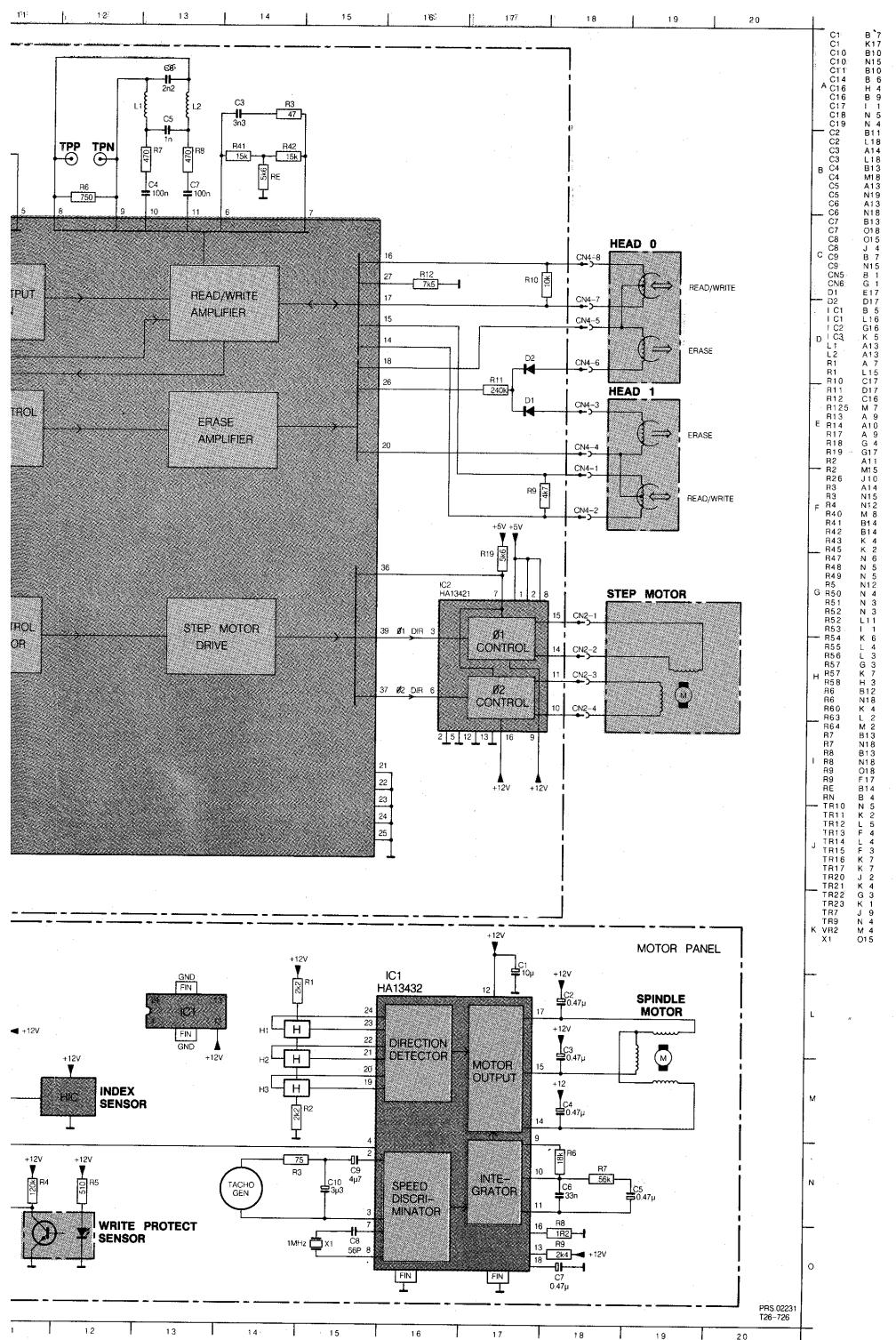




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## **ELECTRICAL DIAGRAM FDD**

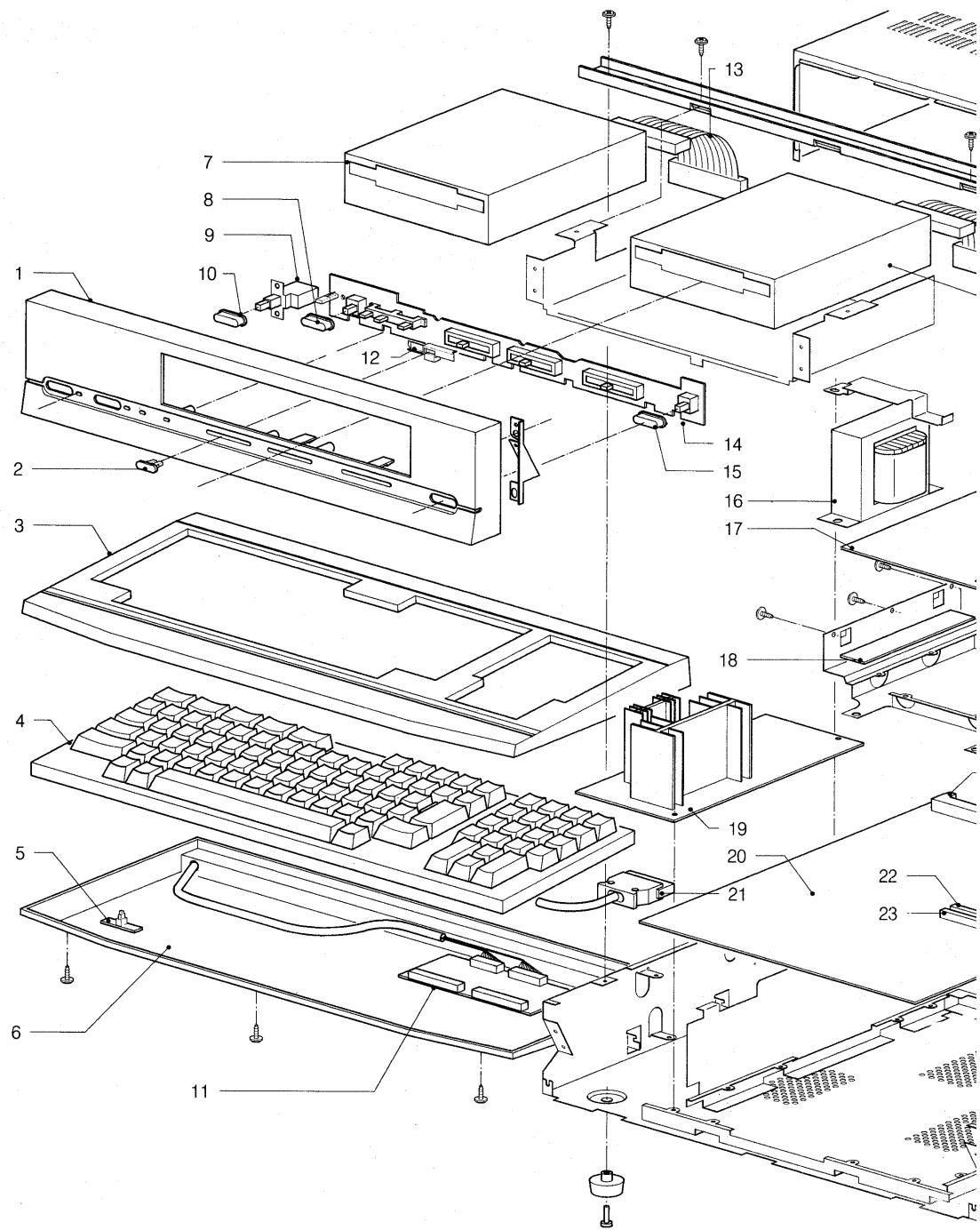


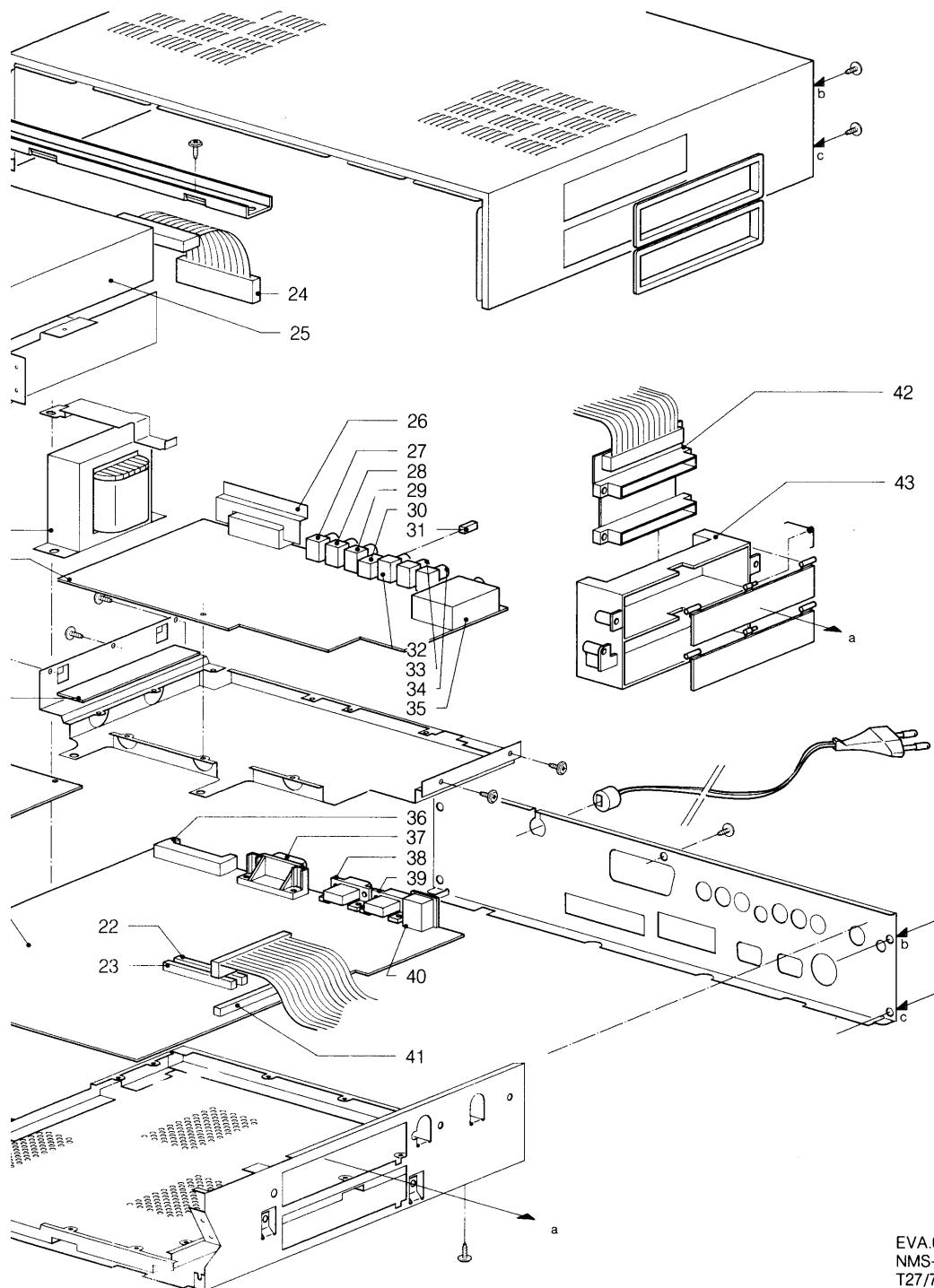
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## MECHANICAL PARTS LIST

1	4822 432 10613	Front panel
2	4822 411 61359	Slide knob
3	4822 432 10593	Keyboard upper case
4	4822 273 20259	Keyboard /00
	4822 693 91125	Keyboard /16
5	4822 212 22687	Caps LED unit
6	4822 432 10592	Keyboard lower case
7	4822 693 91114	Floppy drive
8	4822 413 31468	Source select knob
9	4822 276 12167	Mains switch
10	4822 410 25574	Power on knob
11	4822 212 22683	Keyboard interface panel
12	4822 404 60391	Spacer
13	4822 321 22388	Cable connector
14	4822 219 81061	Control unit
15	4822 410 25575	Reset knob
16	4822 148 80768	Transformer
17	4822 219 81057	Analog unit
	4822 219 81072	Analog unit (modified)*
18	4822 219 81063	Sub analog unit
19	4822 219 81055	Power supply
20	4822 219 81056	Main panel /00
	4822 219 81062	Main panel /16
21	4822 321 22291	Keyboard cable
22	4822 265 61108	Connector
23	4822 265 61108	Connector
24	4822 321 22289	Cable connector
25	4822 693 91114	Floppy drive
26	4822 265 51179	SCART connector
27	4822 264 30214	Connector audio out (L)
28	4822 264 30219	Connector audio out (R)
29	4822 264 30215	Connector video/lum out
30	4822 273 20278	Switch
31	4822 413 31467	Knob
32	4822 264 30214	Connector audio in (L)
33	4822 264 30219	Connector audio in (R)
34	4822 264 30215	Connector video in
35	4822 212 10215	Modulator
36	4822 265 51181	Keyboard connector
37	4822 267 50709	Printer connector
38	4822 266 40148	Joystick connector
39	4822 266 40148	Joystick connector
40	4822 267 50711	Recorder connector
41	4822 265 61109	Connector (50 p)
42	4822 212 22686	Cartridge connector unit
43	4822 256 91171	Cartridge holder

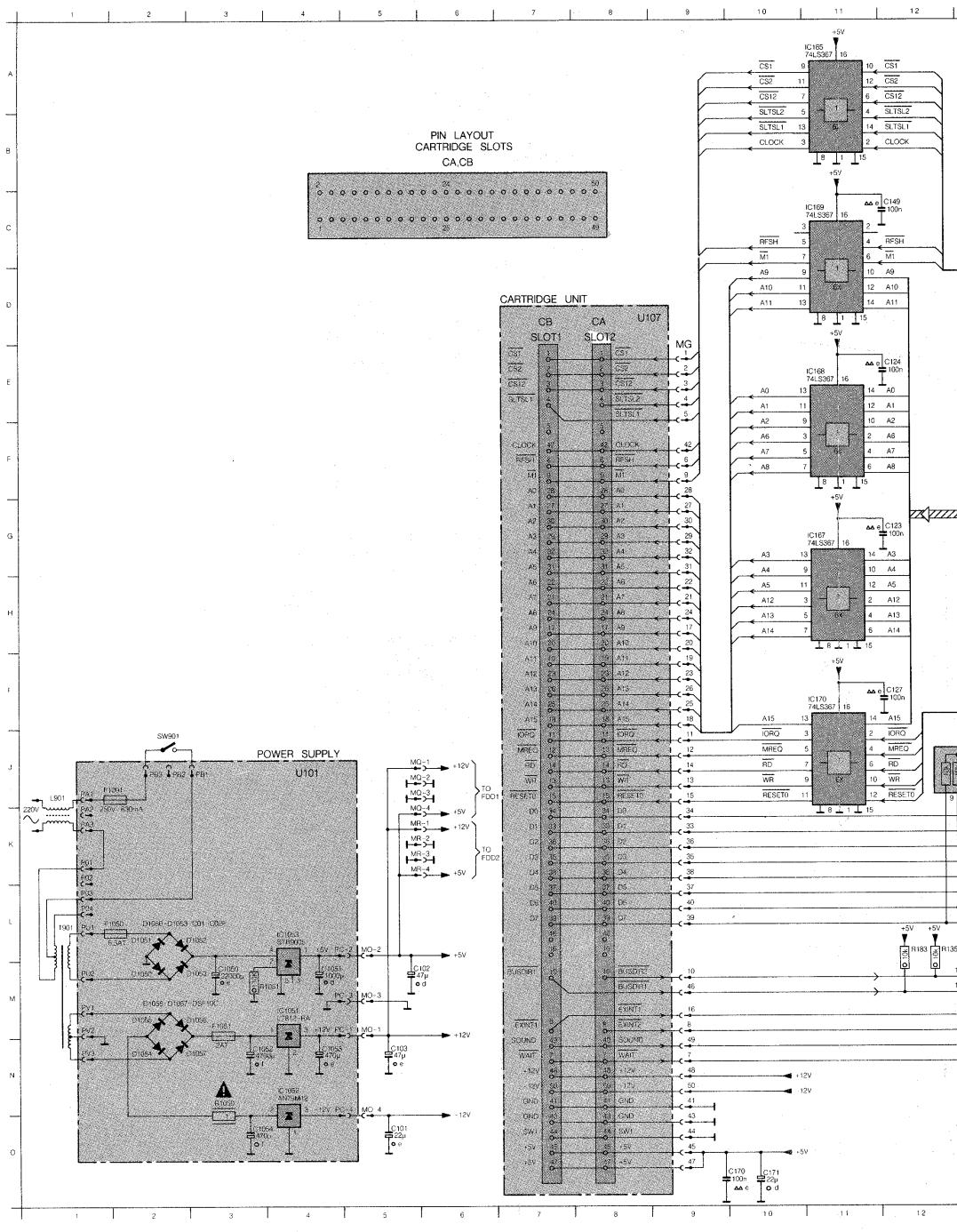
\* The sub analog unit is integrated in this unit.



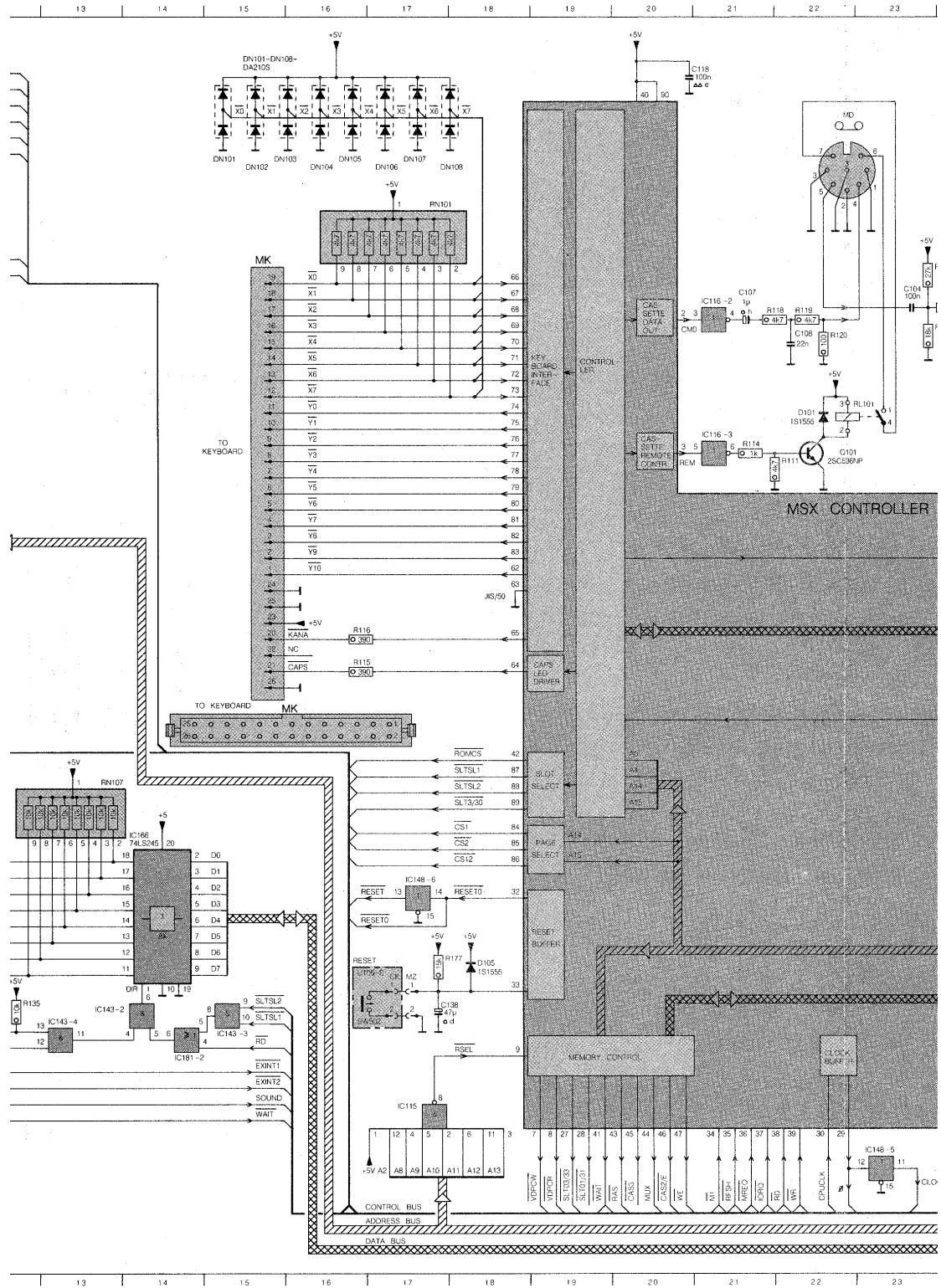


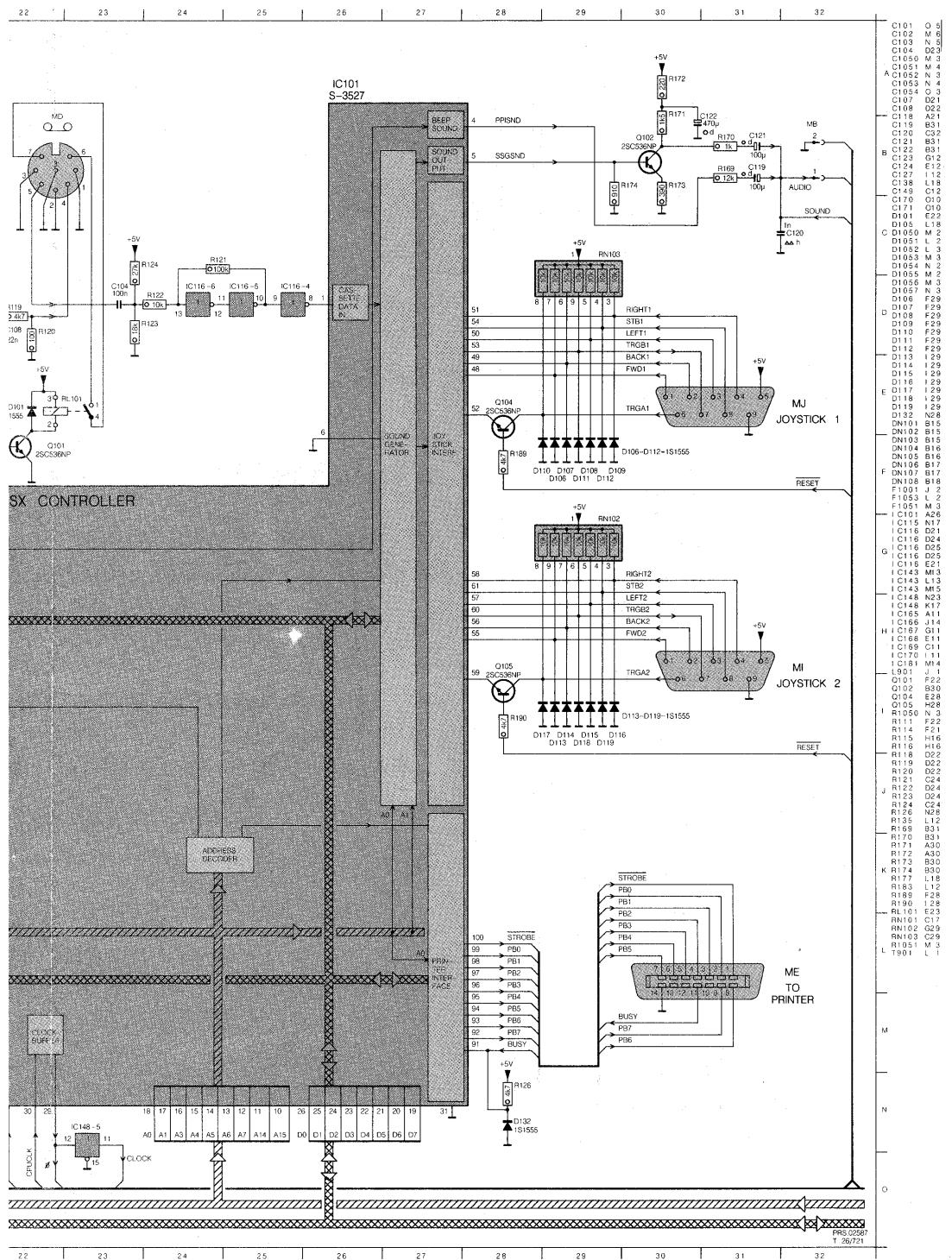
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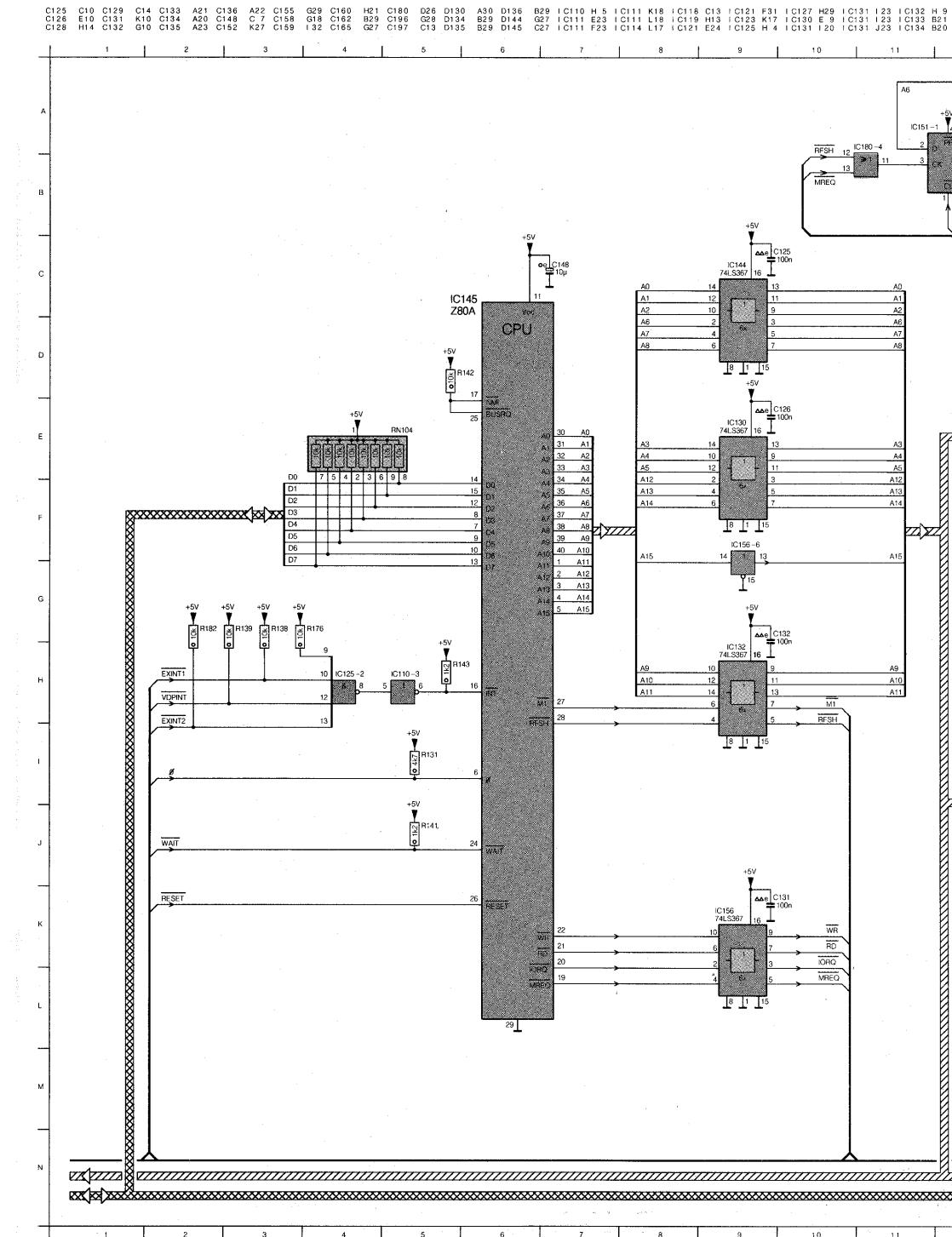
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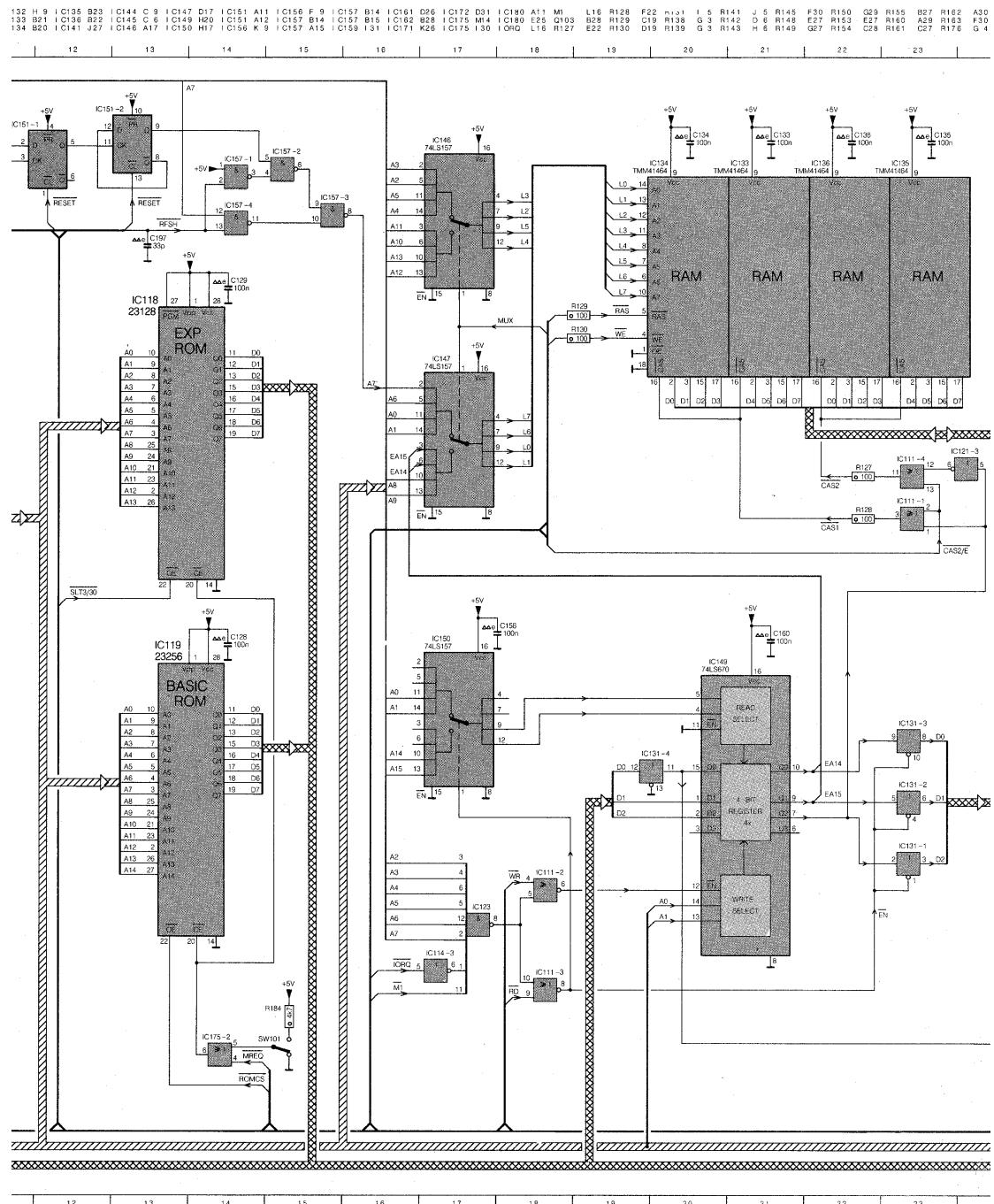


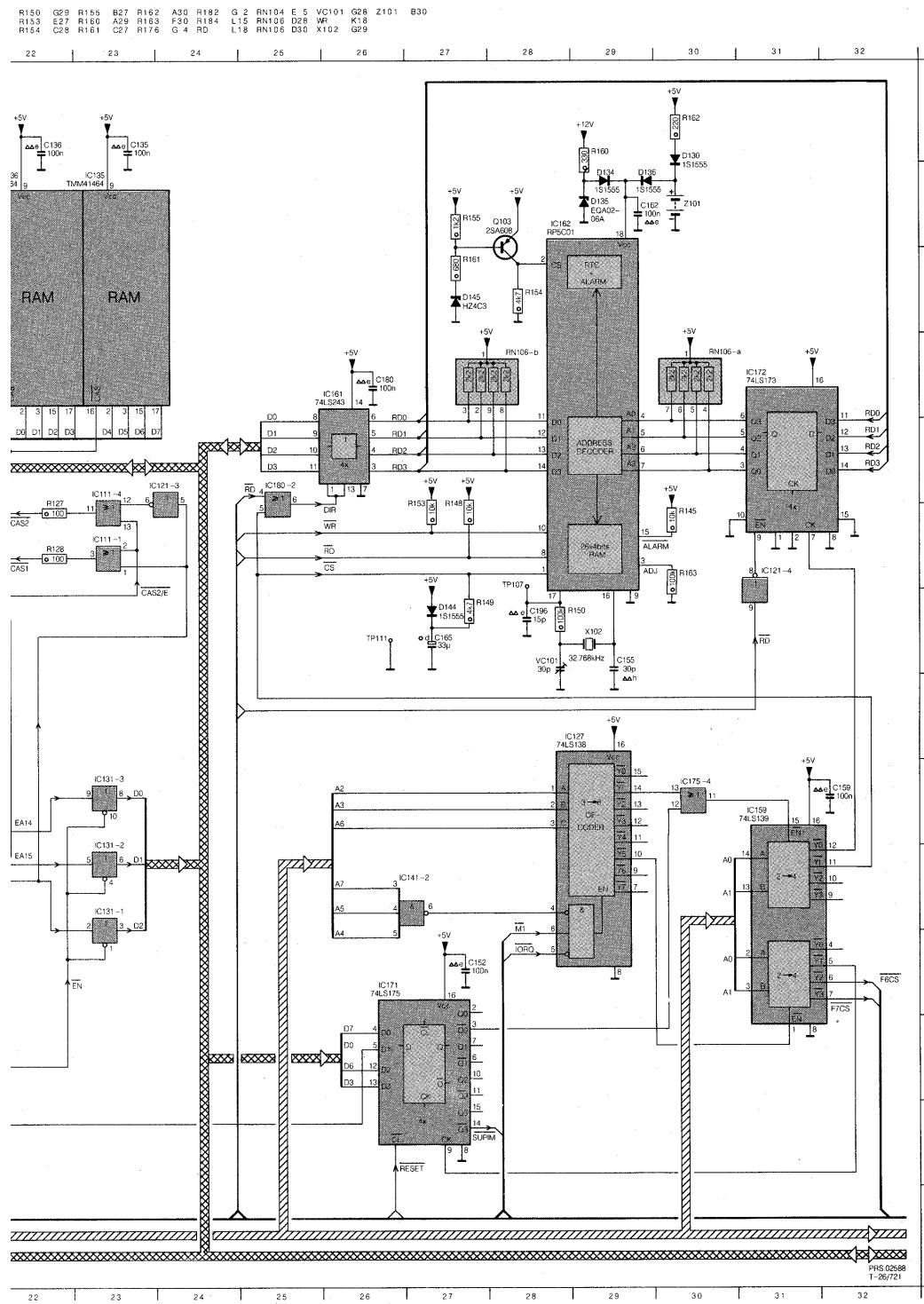
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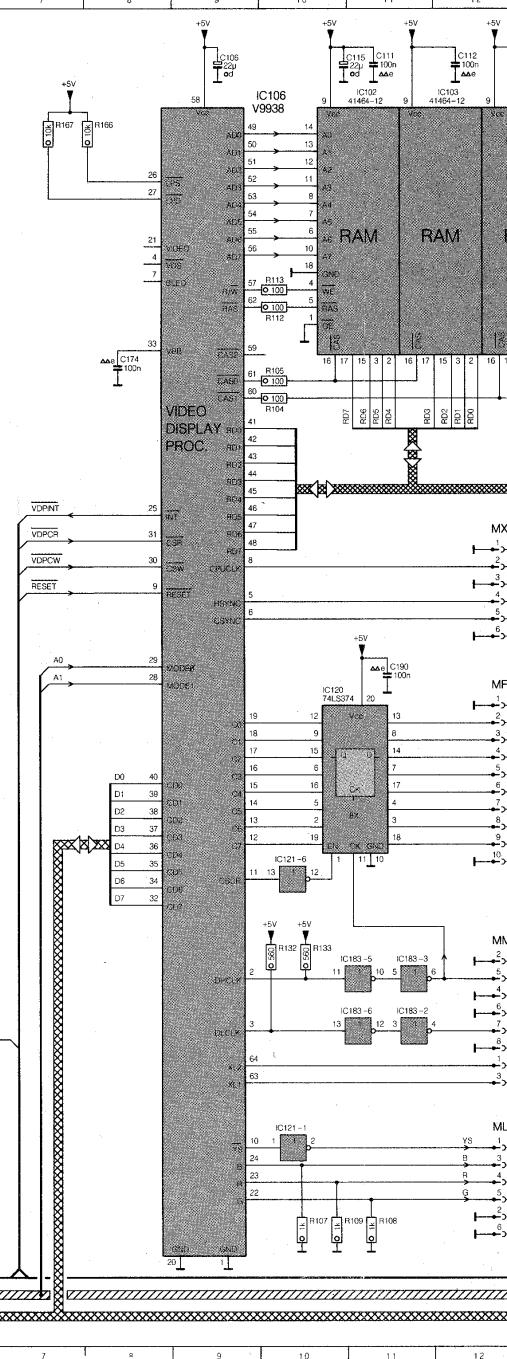
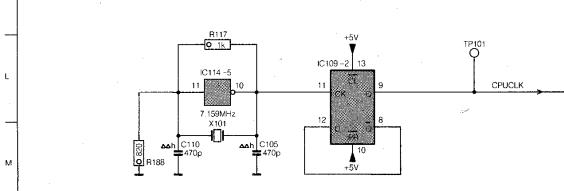


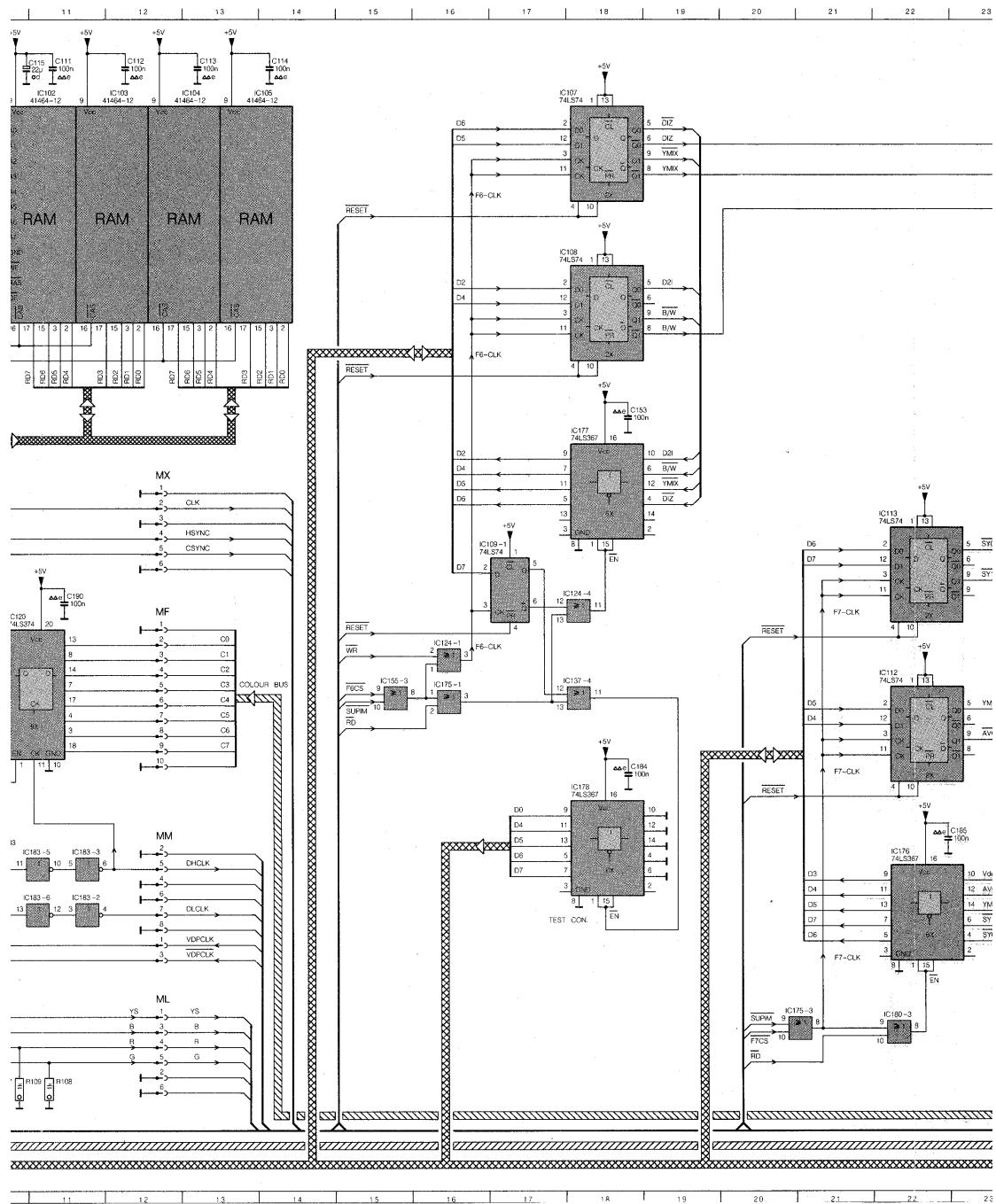


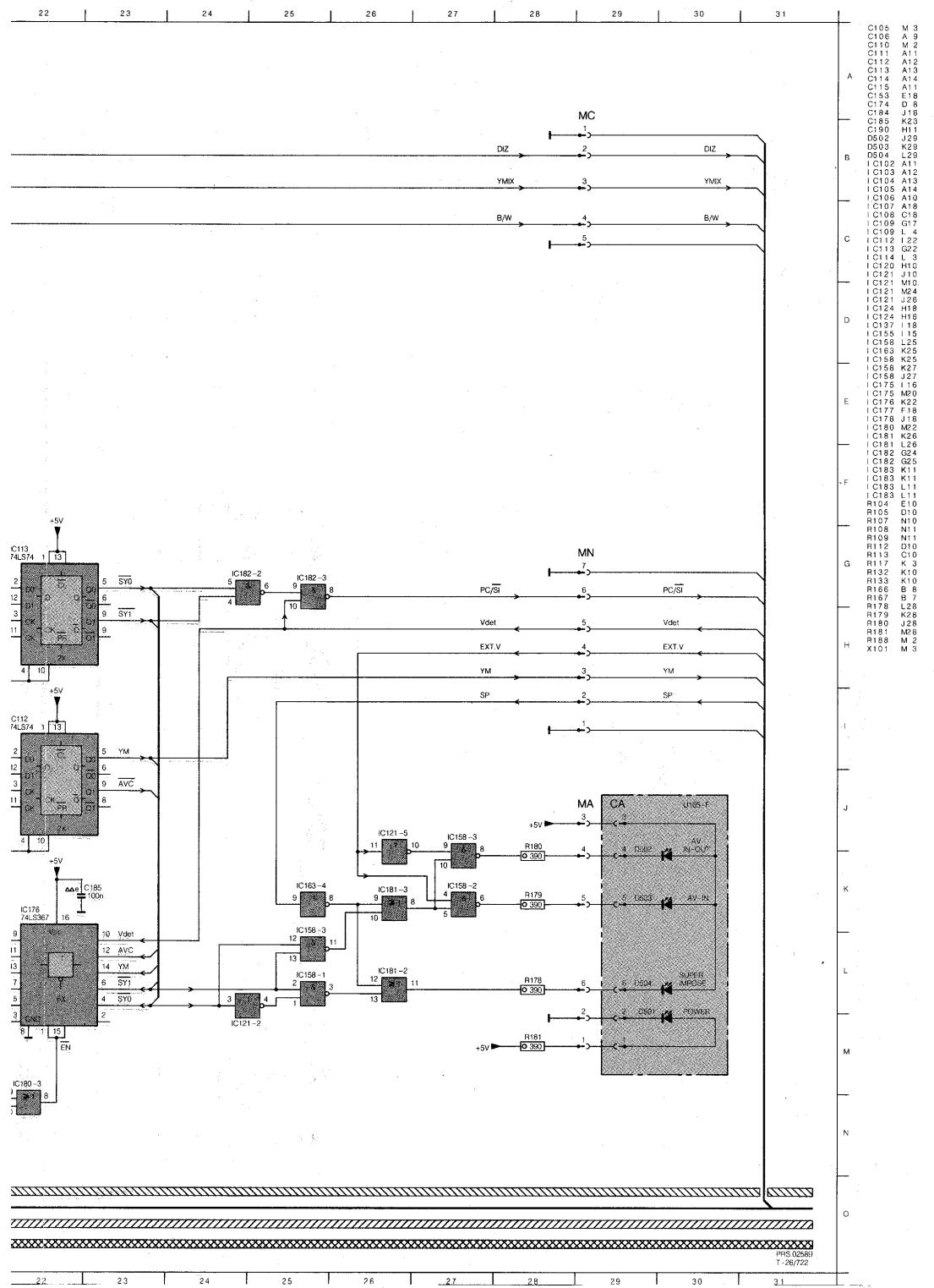


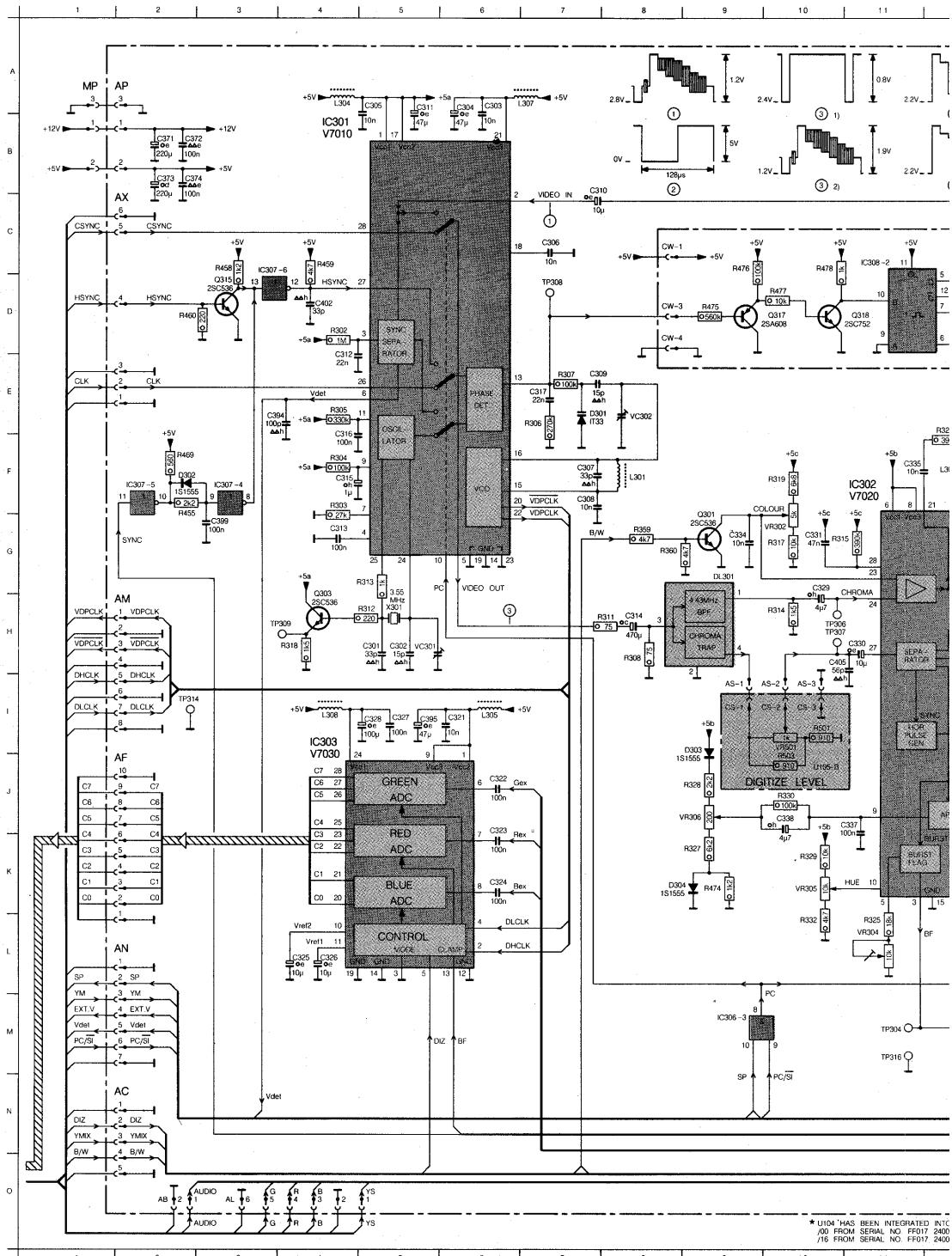
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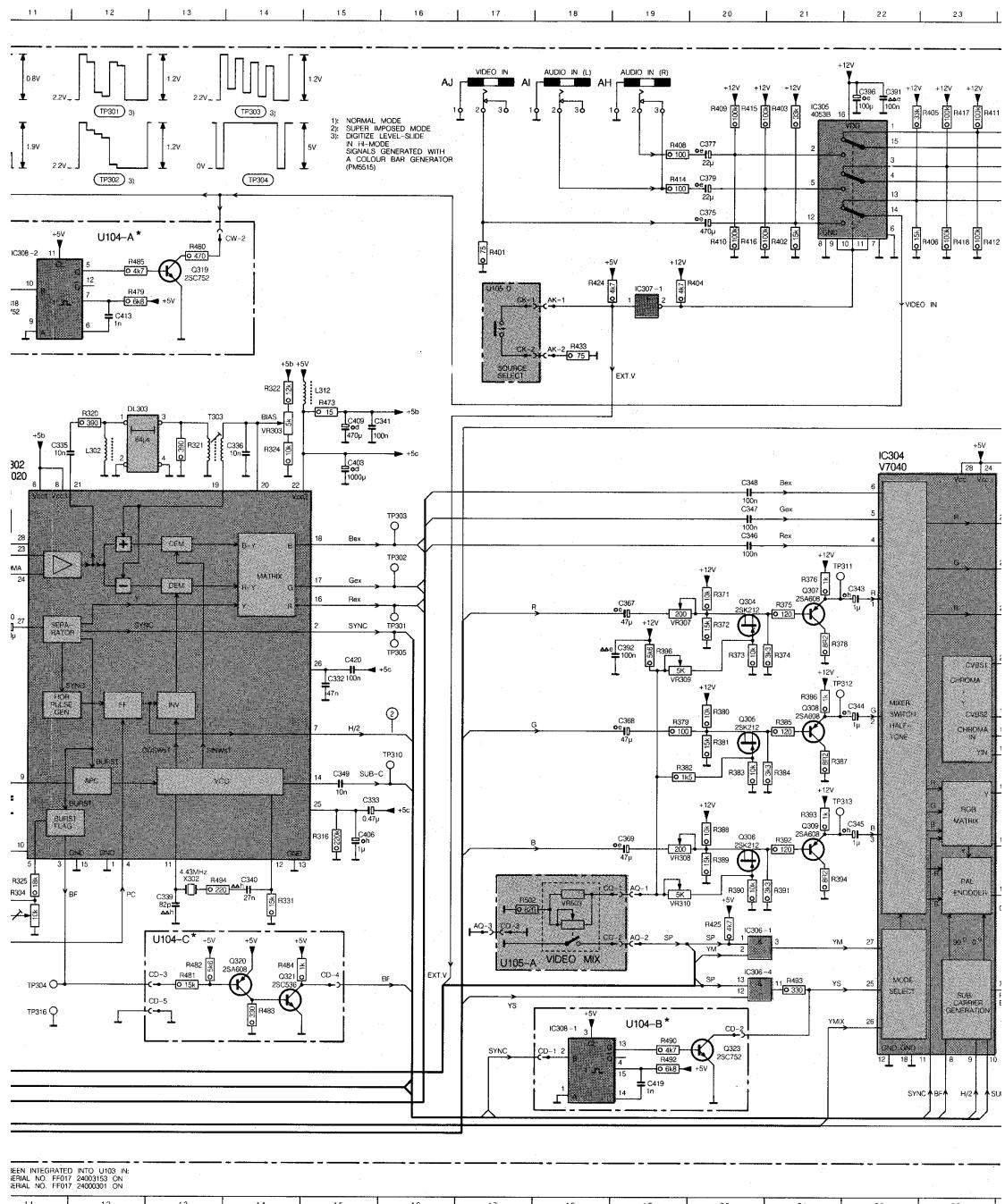
TYPENUMBERS AND POWERSUPPLY-CONNECTIONS OF IC'S							
POS.NR.	TYPE	DESCRIPTION	+5V	↓	+	—	DECOUPLING CAPACITOR
IC107	74LS74	2 FOLD D FLIP-FLOP	14	7	C154-100n	△△ e	
IC108	74LS74	2 FOLD D FLIP-FLOP	14	7			
IC109	74LS74	2 FOLD D FLIP-FLOP	14	7	C140-100n	△△ e	
IC110	74L504	6 INVERTERS	14	7	C194-100n	△△ e	
IC111	74L532	4 2-INPUT OR	14	7			
IC112	74LS74	2 FOLD D FLIP-FLOP	14	7	C186-100n	△△ e	
IC113	74LS74	2 FOLD D FLIP-FLOP	14	7	C187-100n	△△ e	
IC114	74LS04	6 INVERTERS	14	7	C144-100n	△△ e	
IC115	74LS30	8 INPUT NAND	14	7			
IC116	74L504	6 INVERTERS	14	7			
IC121	74LS04	6 INVERTERS	14	7	C182-100n	△△ e	
IC123	74LS30	8 INPUT NAND	14	7			
IC124	74LS32	4 2-INPUT OR	14	7	C141-100n	△△ e	
IC125	74LS20	2 4-INPUT NAND	14	7	C145-100n	△△ e	
IC128	74H1C133	1 13-INPUT NAND	16	8			
IC131	74LS125	4 THREE-STATE BUFFERS	14	7			
IC137	74LS32	4 2-INPUT OR	14	7	C142-100n	△△ e	
IC138	74LS367	6 3-STATE BUFFERS	16	8	C193-100n	△△ e	
IC149	74LS14	6 SCHMITT-TRIGGER INVERTERS	14	7	C116-100n	△△ e	
IC141	74LS10	3 3-INPUT NAND	14	7			
IC142	7436	4 2-INPUT OPEN COLLECTOR NAND	14	7	C139-100n	△△ □	
IC143	74LS08	4 2-INPUT AND	14	7	C122-100n	△△ e	
IC148	74LS367	6 3-STATE BUFFERS	16	8	C191-100n	△△ e	
IC151	74LS74	2 FOLD D FLIP-FLOP	14	7			
IC152	74LS74	2 FOLD D FLIP-FLOP	14	7	C192-100n	△△ e	
IC155	74LS32	4 2-INPUT OR	14	7	C143-100n	△△ e	
IC157	74LS03	4 2-INPUT NAND	14	7	C161-100n	△△ e	
IC158	74LS00	4 2-INPUT NAND	14	7	C163-100n	△△ e	
IC163	74L504	6 INVERTERS	14	7	C178-100n	△△ e	
IC164	7436	4 2-INPUT OPEN COLLECTOR NAND	14	7	C117-102n	△△ e	
IC175	74LS32	4 2-INPUT OR	14	7			
IC180	74LS32	4 2-INPUT OR	14	7	C181-102n	△△ e	
IC181	74LS32	4 2-INPUT OR	14	7	C179-102n	△△ e	
IC182	74LS00	4 2-INPUT NAND	14	7	C189-100n	△△ e	

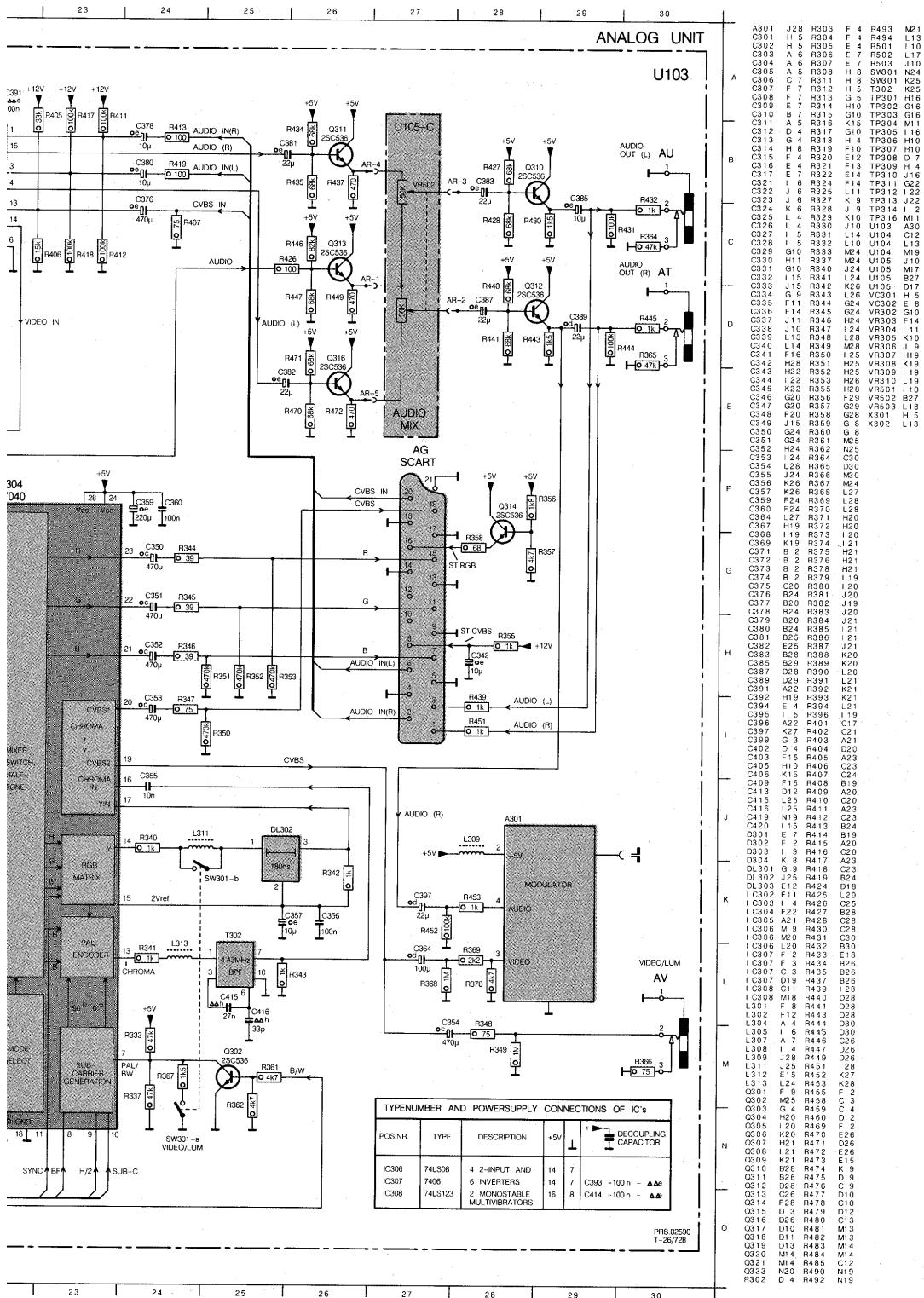


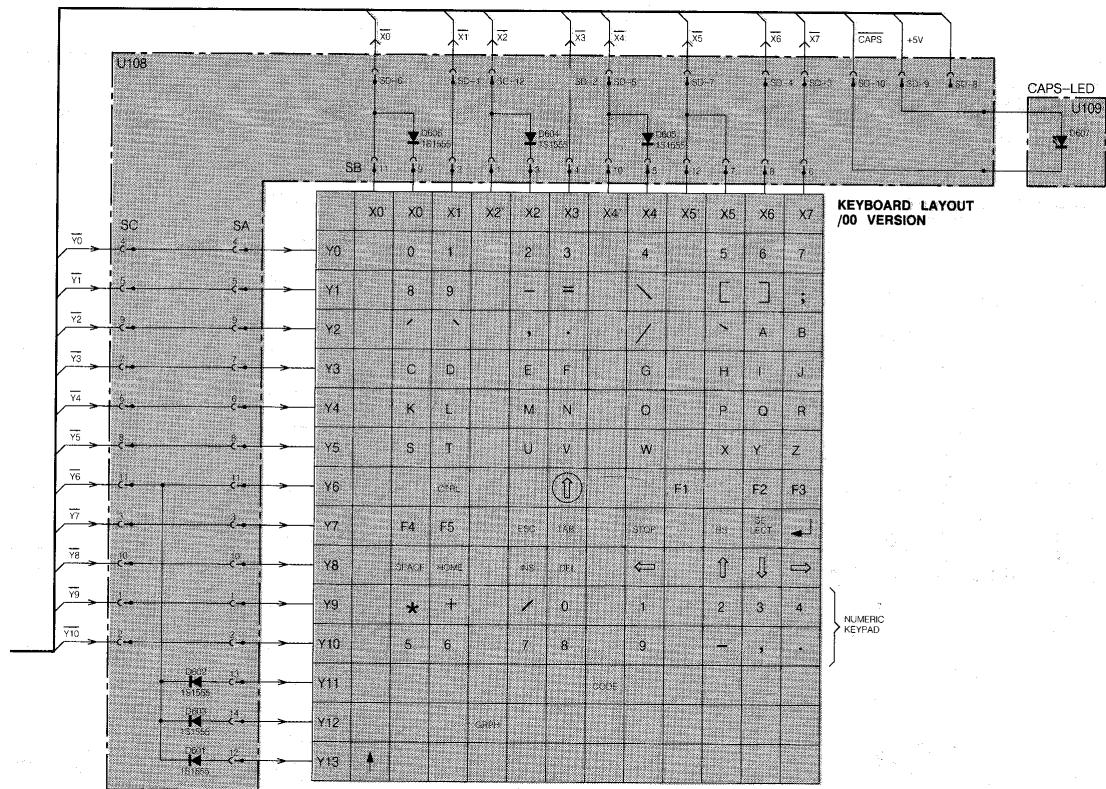










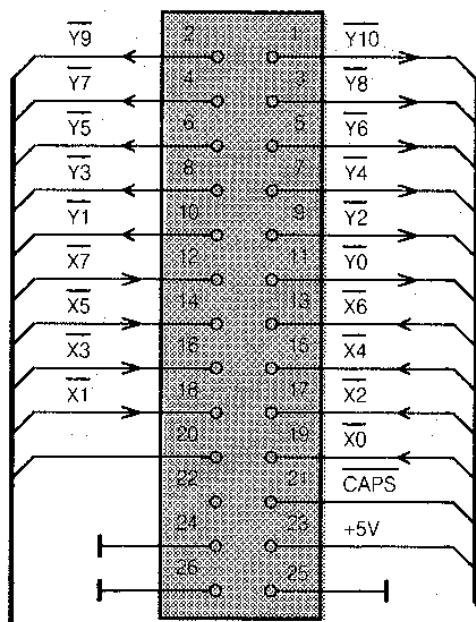


	X0'	X0	X1	X2'	X2	X3	X4	X4'	X5	X5'	X6	X7
Y0	0	1		2	3	4		5	6	7		
Y1	8	9		-	=	\		[	]	~		
Y2	/	^	*	.	/			~	A	B		
Y3	C	D	E	F	G	H	I	J				
Y4	K	L	M	N	O	P	Q	R				
Y5	S	T	U	V	W	X	Y	Z				
Y6	CTRL	(UP)			F1	F2	F3					
Y7	F4	F5	ESC	TAB	STOP	BS	SE-LFT	<				
Y8	SPACE	HOME	END	INS	DEL	(DOWN)	(UP)	(DOWN)	(UP)			
Y9	*	+		/	0	1	2	3	4			
Y10	5	6		7	8	9	-	,	*			
Y11												
Y12												
Y13	▲											

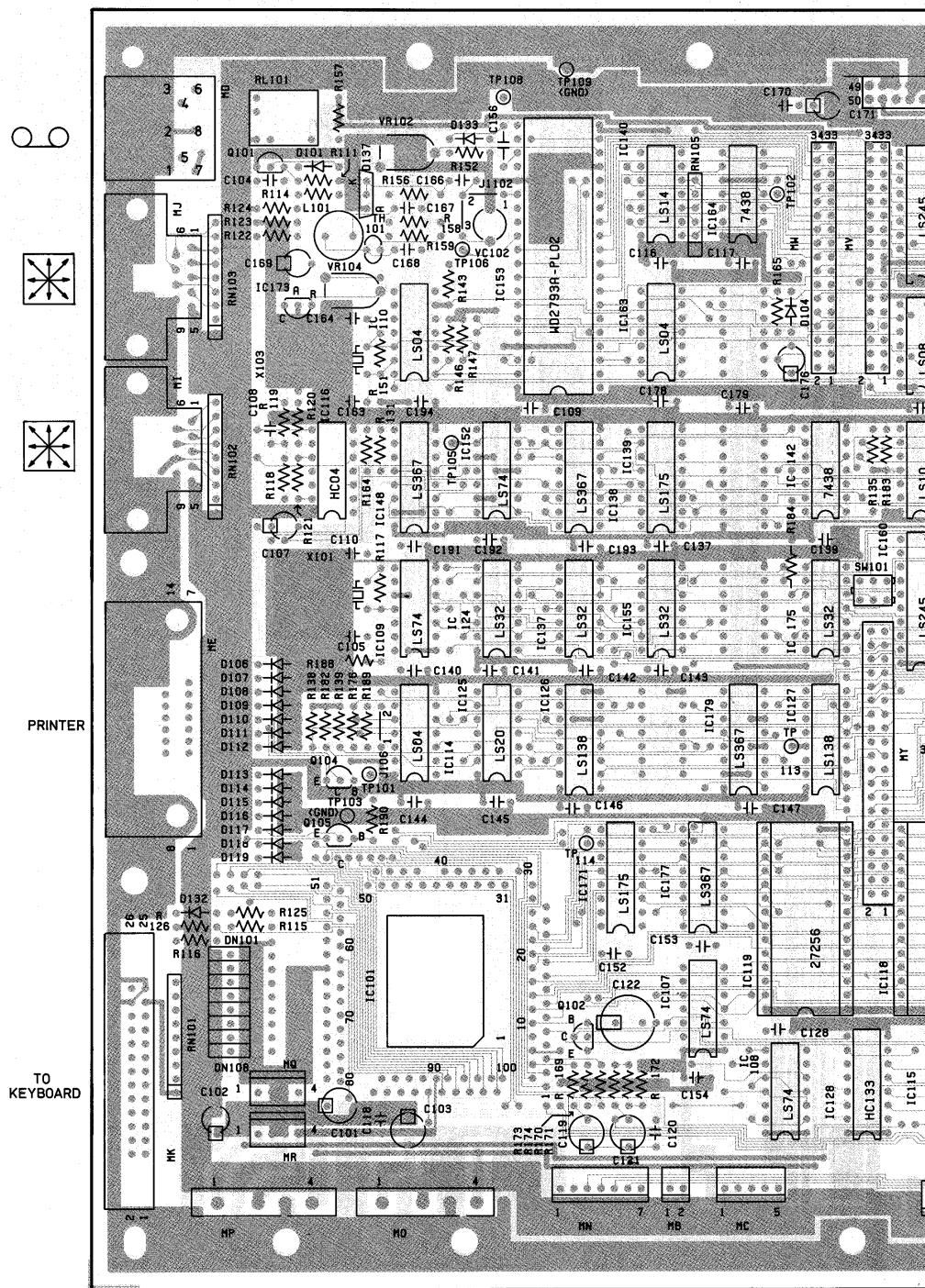
KEYBOARD LAYOUT /16 VERSION

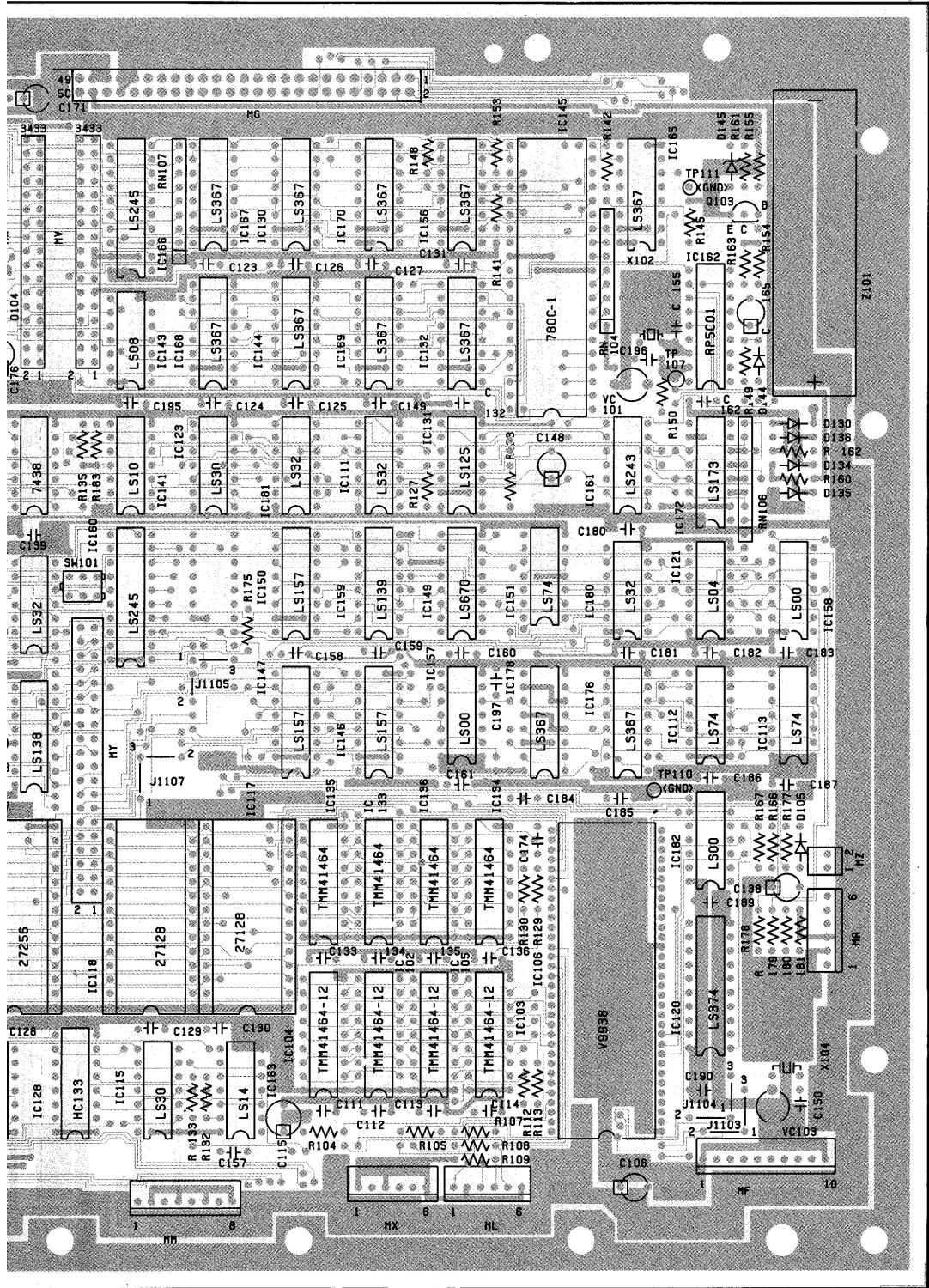
NUMERIC KEYPAD

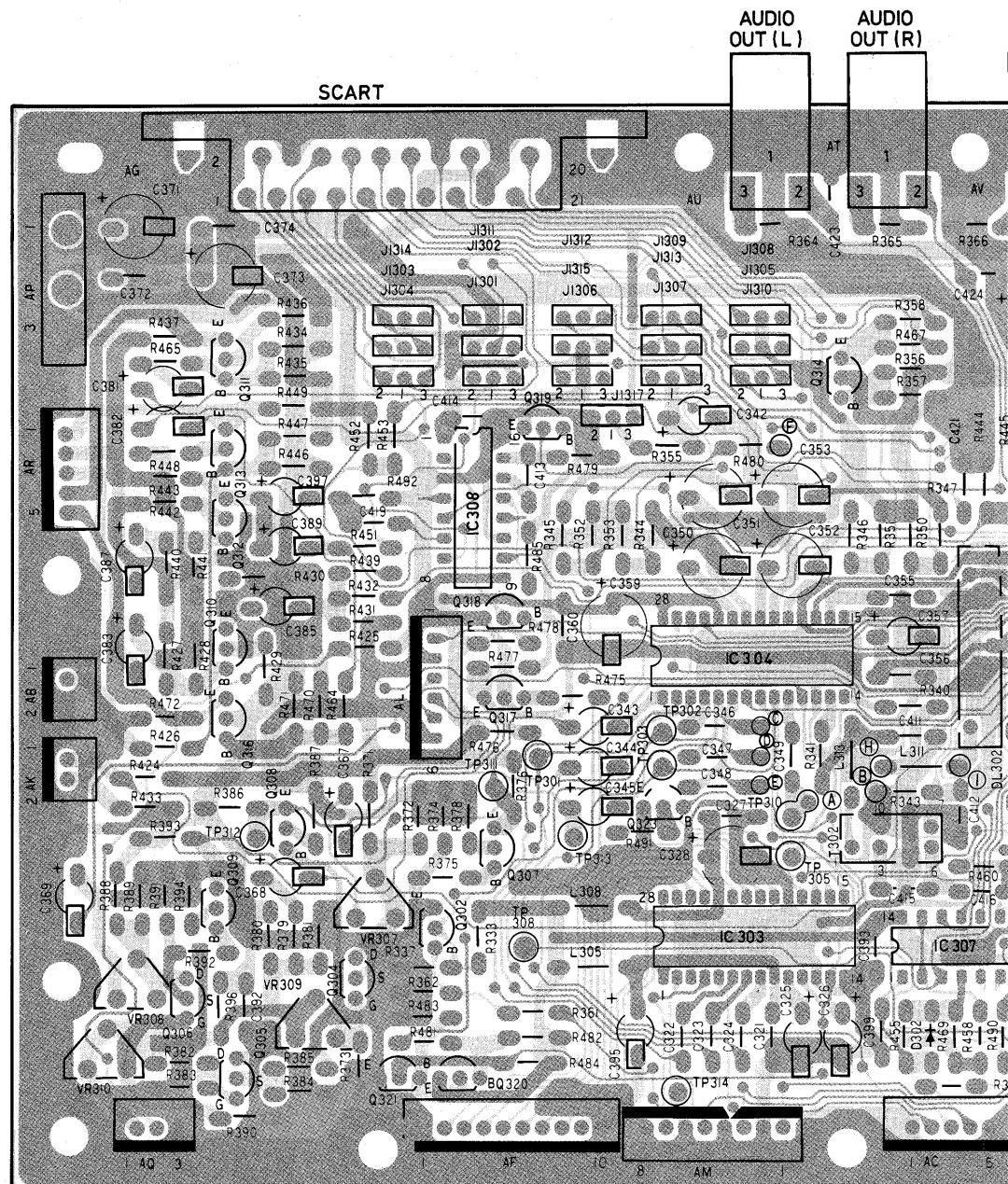
MK



## MAIN PRINTED BOARD

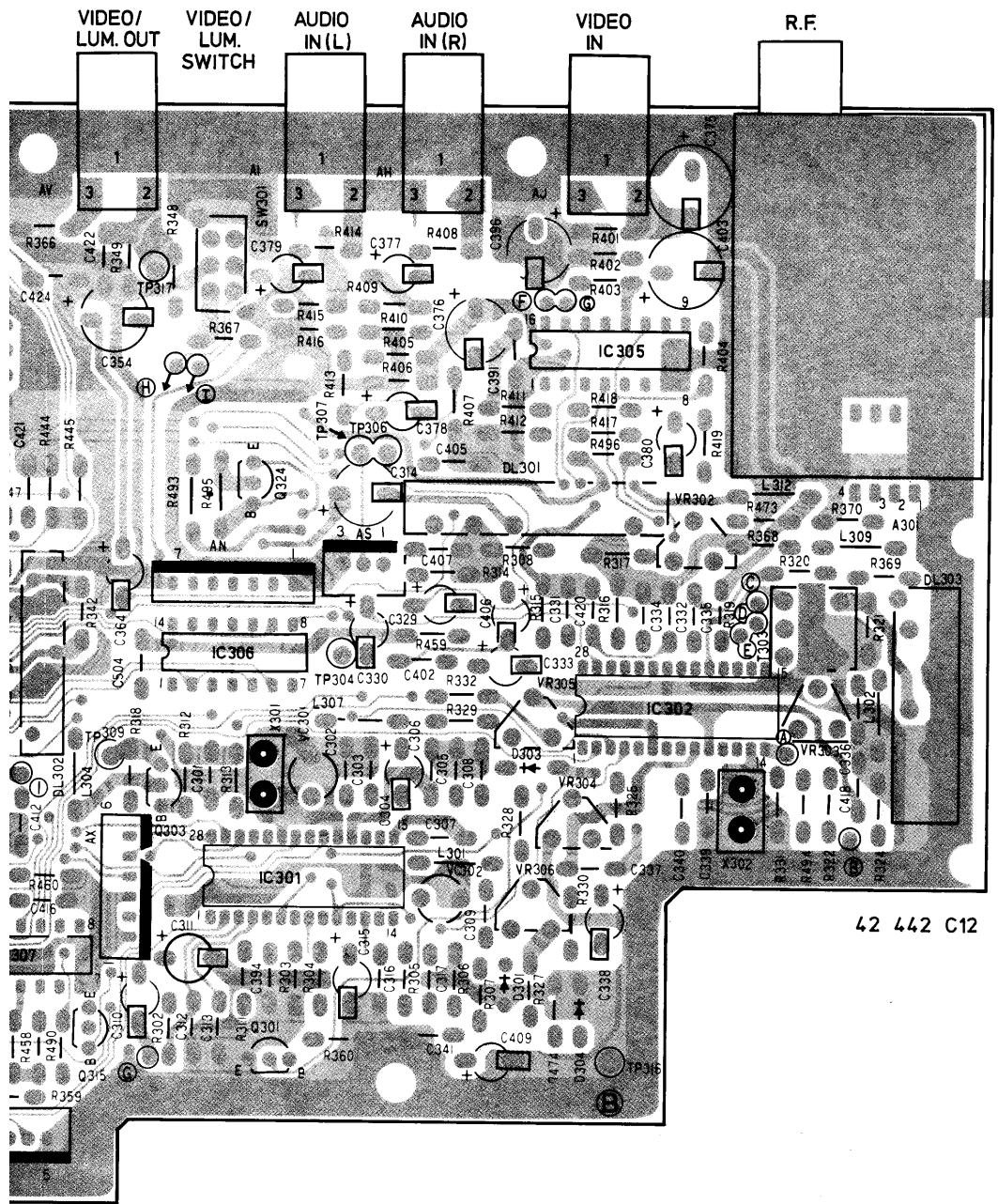






### **ANALOG UNIT (Component side)**

For: /00 from serial no. FF017 24003153 on  
/16 from serial no. FF017 24000301 on

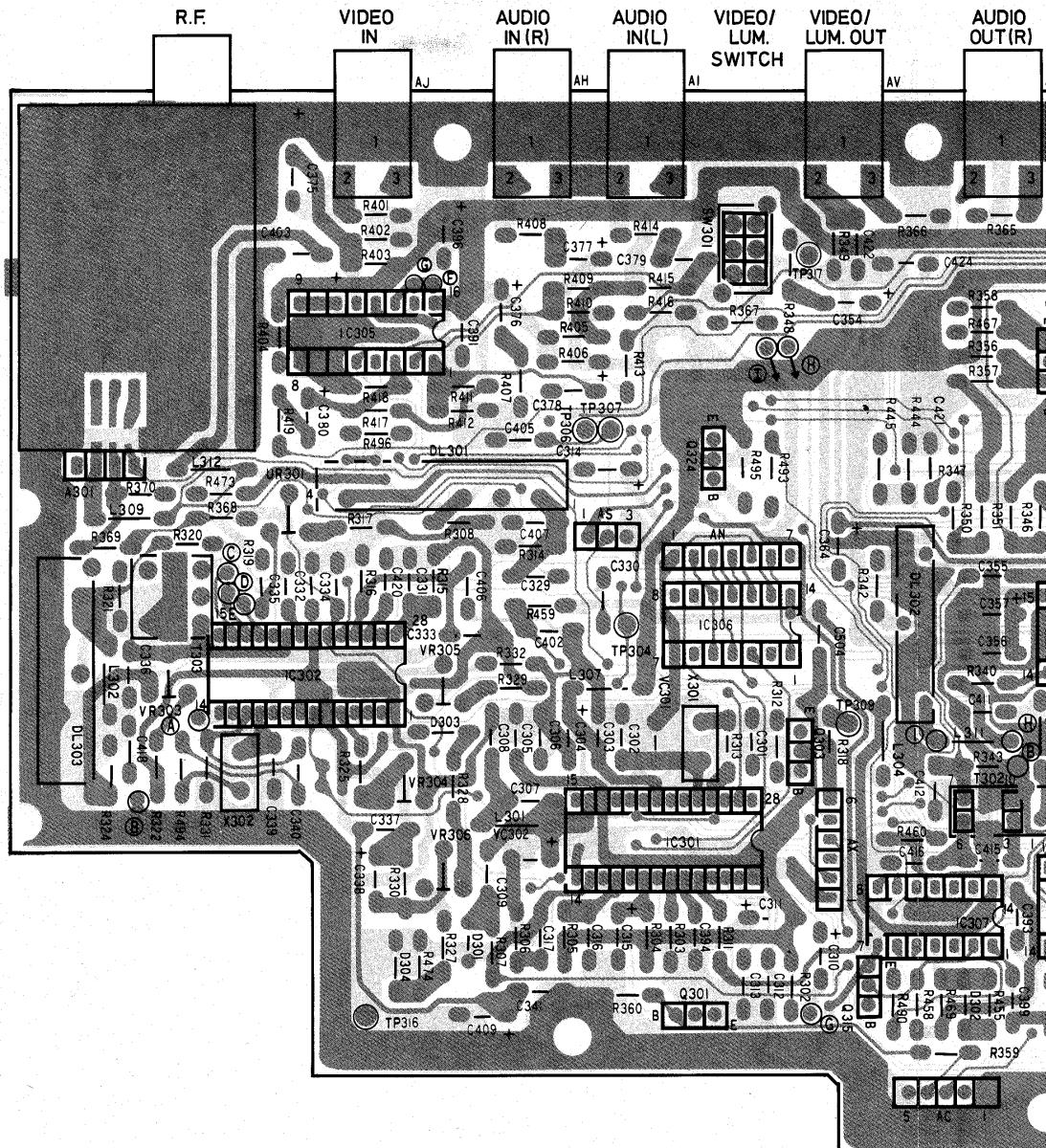


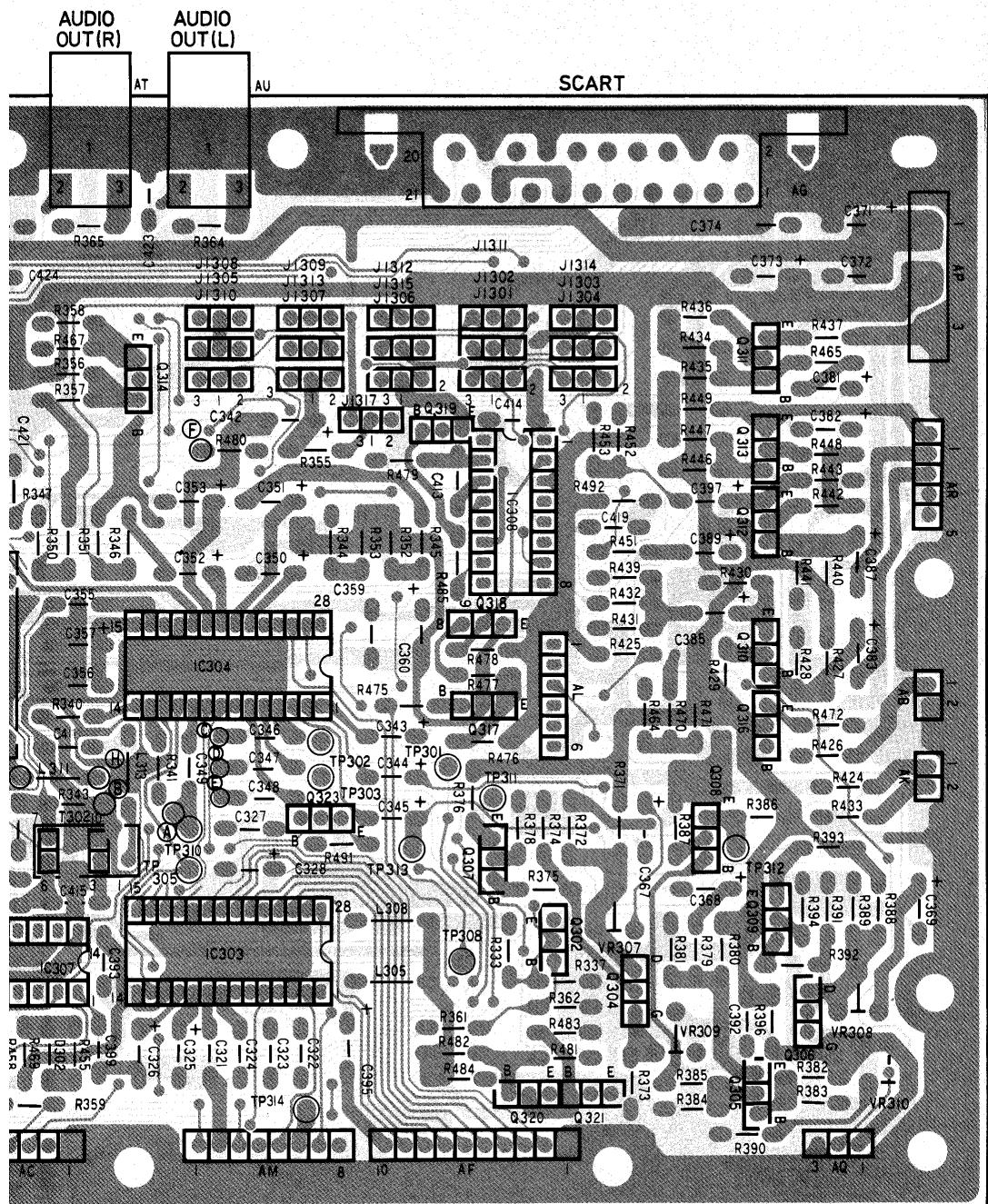
42 442 C12

CS 9 278

### **ANALOG UNIT (Copper side)**

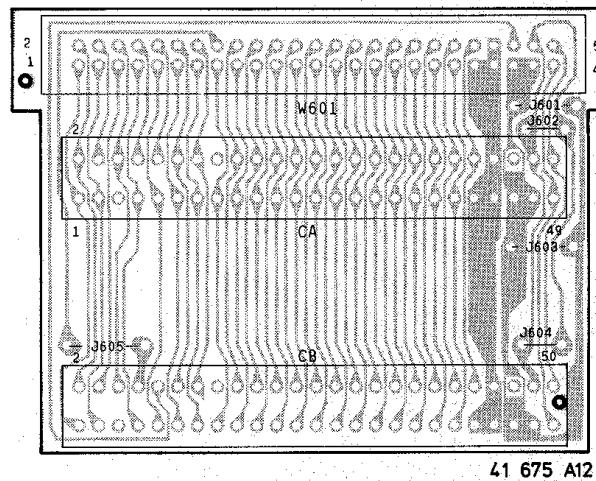
For: /00 from serial no. FF017 24003153 on  
/16 from serial no. FF017 24000301 on



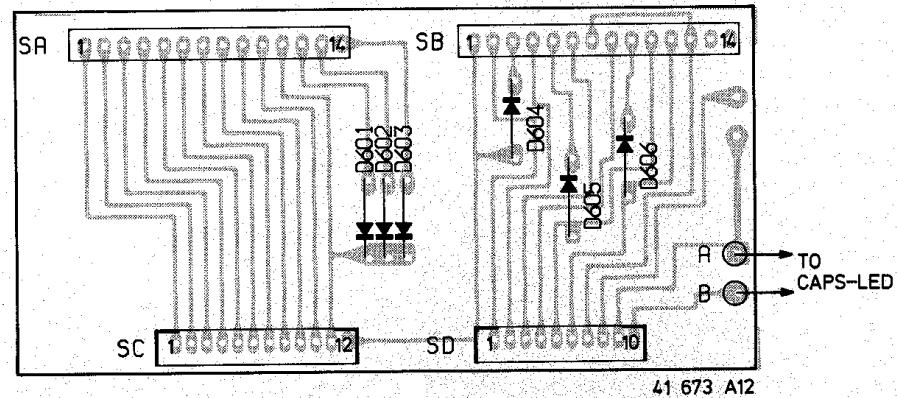


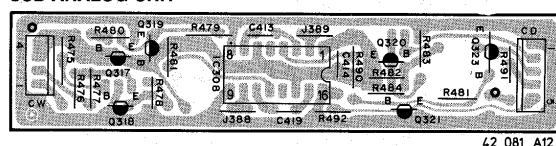
42 443 C12

### CARTIDGE UNIT

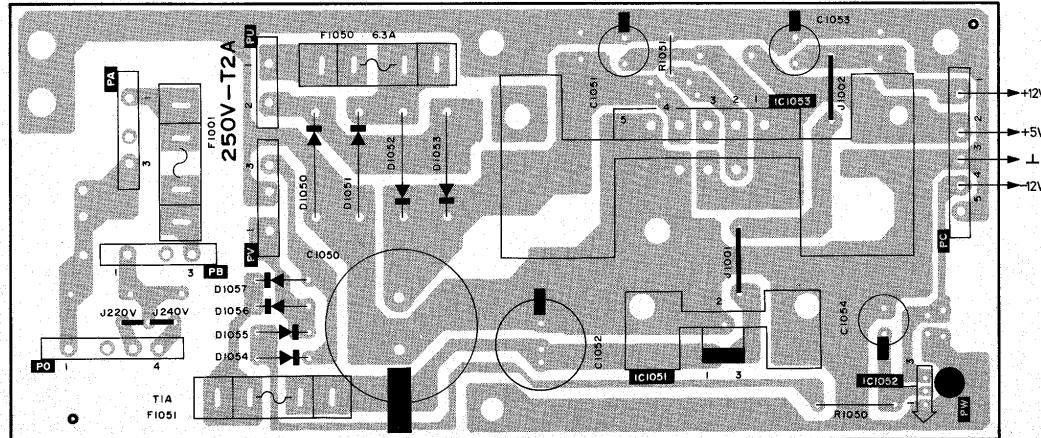


### KEYBOARD INTERFACE UNIT

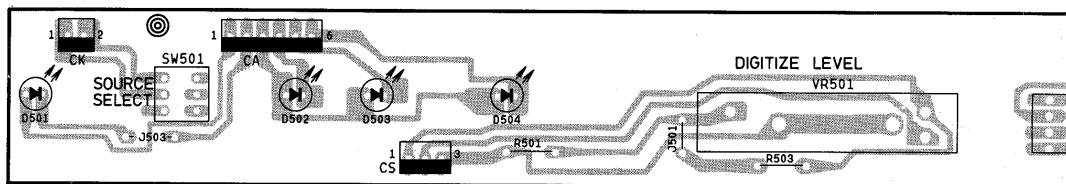
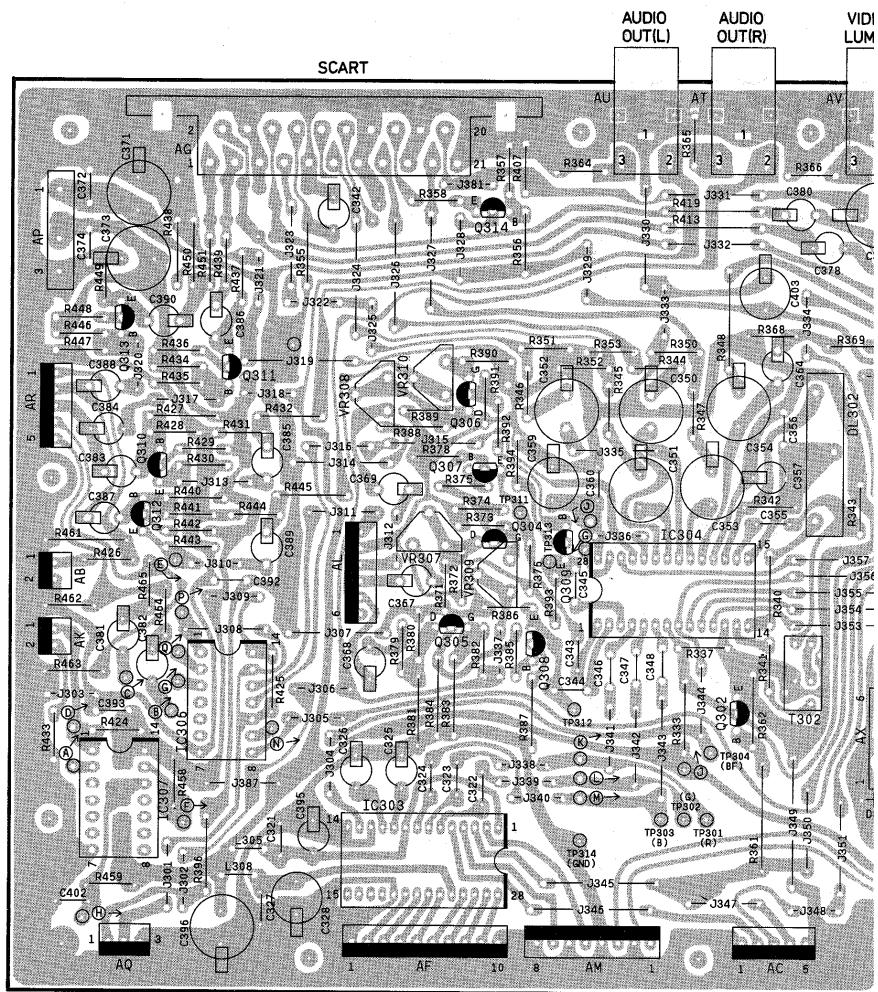


**SUB ANALOG UNIT**

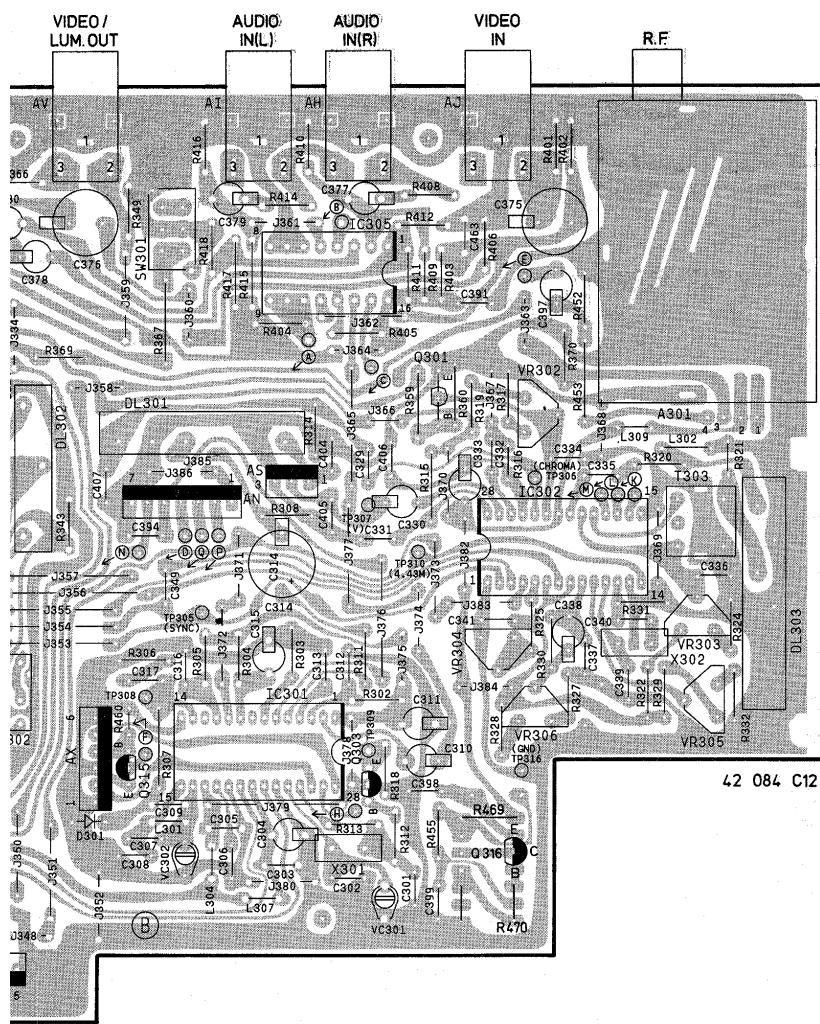
42 081 A12

**POWER SUPPLY**

42 082 B12

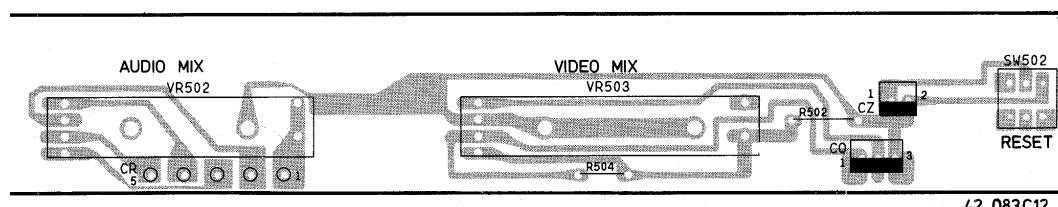


## **ANALOG UNIT**



42 084 C12

## CONTROL UNIT



42 083C12

CS 9 280

MAIN PRINTED BOARD

U...			
U100	Main printed board/00 4822 219 81056 Main printed board/16 4822 219 81062	Q101,Q102 2SC536NP Q103 2SA608 Q104,Q105 2SC536NP DN101-DN108 DA210S	4822 130 41397 4822 130 41202 4822 130 41397 4822 130 80157
EM...		D101, D104-D119, D130-D134, D136,D144 D135 D137 D145	1S1555 } 4822 130 31031 EQA02-06A 4822 130 80155 SVC203 4822 130 80156 HZ4C3 Zener 4822 130 80109
IC101	S-3527 4822 209 11097	RN101 8x4K7	4822 111 91302
IC102-IC105	81464-12 4822 209 83426	RN102-RN104 8x10K	4822 111 91304
IC106	V9938 4822 209 83425	RN105 5x1K	4822 111 91305
IC107-IC109	74LS74 4822 209 71408	RN106 8x2K2	4822 111 91303
IC110	74LS04 4822 209 70979	RN107 8x10K	4822 111 91304
IC111	74LS32 4822 209 71402	TH101 N.T.C. SDT-100	4822 116 30295
IC112,IC113	74LS74 4822 209 71408	VR102 Variable 50K	4822 100 20611
IC114	74LS04 4822 209 70979	VR104 Variable 10K	4822 100 20612
IC115	74LS30 4822 209 83428		
IC116	74HC04 4822 209 70194		
IC117	DISK-ROM 4822 209 51209		
IC118	EXP. ROM /00 4822 209 51212		
IC119	EXP. ROM /16 4822 209 51282		
	BASIC-ROM /00 4822 209 51211		
	BASIC-ROM /16 4822 209 51279		
IC120	74LS374 5322 209 70543		
IC121	74LS04 4822 209 70979		
IC122	74LS30 4822 209 83428		
IC124	74LS32 4822 209 71402		
IC125	74LS20 4822 209 71411		
IC126,IC127	74LS138 4822 209 71403		
IC128	74HC133 4822 209 83416		
IC130	74LS367 4822 209 71406	C104 100n 50V mylar	4822 121 42944
IC131	74LS125 4822 209 83413	C108 22n 50V mylar	4822 121 42417
IC132	74LS367 4822 209 71406	C156 220n 50V mylar	4822 121 42996
IC133-IC136	81464-12 4822 209 83426	C166 10n 50V mylar	4822 121 42946
IC137	74LS32 4822 209 71402	C167 100n 50V mylar	4822 121 42944
IC138	74LS367 4822 209 71406	C168 10n 50V mylar	4822 121 42946
IC139	74LS175 4822 209 71399	VC101 Trimmer	4822 125 50333
IC140	74LS14 4822 209 83427		
IC141	74LS10 4822 209 71412		
IC142	7438 4822 209 71413		
IC143	74LS08 4822 209 71407		
IC144	74LS367 4822 209 71406	X101 7.159 MHz	4822 242 71787
IC145	Z80A 4822 209 10569	X102 32.768 kHz	4822 242 71345
IC146,IC147	74LS157 4822 209 71404	X103 4 MHz	4822 242 71665
IC148	74LS367 4822 209 71406		
IC149	74LS670 4822 209 71422		
IC150	74LS157 4822 209 71404		
IC151,IC152	74LS74 4822 209 71408		
IC153	WD2793A 4822 209 11146		
IC155	74LS32 4822 209 71402	RL101 Relay	4822 280 20277
IC156	74LS367 4822 209 71406	Z101 NI-CD Accumulator	4822 138 10213
IC157,IC158	74LS00 4822 209 71401	L101 Coil	4822 157 52909
IC159	74LS139 4822 209 71409	SW101 Service switch	4822 276 12227
IC161	74LS243 4822 209 71417		
IC162	RP5C01 4822 209 83431		
IC163	74LS04 4822 209 70979		
IC164	7438 4822 209 71413		
IC165	74LS367 4822 209 71406		
IC166	74LS245 4822 209 71405		
IC167-IC170	74LS367 4822 209 71406		
IC171	74LS175 4822 209 71399		
IC172	74LS173 4822 209 71416		
IC173	AN1431T 4822 209 71418		
IC175	74LS32 4822 209 71402		
IC176-IC178	74LS367 4822 209 71406		
IC180-IC181	74LS32 4822 209 71402		
IC182	74LS00 4822 209 71401		
IC183	74LS14 4822 209 83427		

### ANALOG UNIT

					
U103	Complete analog unit	4822 219 81057	DL301	Delay line	4822 320 40159
	Analog unit (modified)*	4822 219 81072	DL302	Delay line	4822 320 40158
			DL303	1H delay line	4822 320 40161
			L301	1 $\mu$	4822 157 53107
			L302	3 $\mu$ 9	4822 157 53105
			L304,L305,	4 $\mu$ 7	4822 157 53106
			L307,L308,		
			L309		
			L311	220 $\mu$	4822 157 53104
			L312	Coil	4822 157 53108
			L313	15 $\mu$	4822 157 53181
					
			C303,C305,	10n 50V mylar	4822 121 90038
			C306,C308		
			C312	22n 50V mylar	4822 121 42417
			C313,C316	100n 50V mylar	4822 121 42944
			C317	22n 50V mylar	4822 121 42417
			C321	10n 50V mylar	4822 121 90038
			C322-C324,	100n 50V mylar	4822 121 42944
			C327		
			C331,C332	47n 50V mylar	4822 121 43016
			C333	0,47 $\mu$ 35V tantal	4822 124 10672
			C334-C336	10n 50V mylar	4822 121 90038
			C337,C341,	100n 50V mylar	4822 121 42944
			C346-C348		
			C349,C355	10n 50V mylar	4822 121 90038
			C356,C360	100n 50V mylar	4822 121 42944
			C399,C420		
			VC301,VC302	18p variable	4822 125 50349
					
			<b>VARIOUS</b>		
			X301	3.55 MHz crystal	4822 242 71788
			X302	4.43 MHz crystal	4822 242 71393
			T302	4.43 BPF	4822 242 71789
			T303	Transformer	4822 148 80769

\* The sub analog unit is integrated in this unit.

### SUB ANALOG UNIT

					
U104	Complete sub analog unit	4822 219 81063	Q317	2SA608	4822 130 41202
			Q318,Q319	2SC752	4822 130 60709
			Q320	2SA608	4822 130 41202
			Q321,Q323	2SC536	4822 130 41397
					
IC308	74LS123	5322 209 85602	C413	1n 50V mylar	4822 121 42945
			C414	10n 50V mylar	4822 121 42944
			C419	1n 50V mylar	4822 121 42945

## POWER SUPPLY

		
U101	Complete power supply	4822 219 81055
		
IC1051	L7812-RA	4822 209 71421
IC1052	AN79M12	4822 209 71414
IC1053	STR9005	4822 209 71831
		
D1050-D1053	C01-02F	4822 130 80342
D1054-D1057	DSF10C	4822 130 32508
<b>VARIOUS</b>		
R1050	Fusible resistance	4822 113 90219

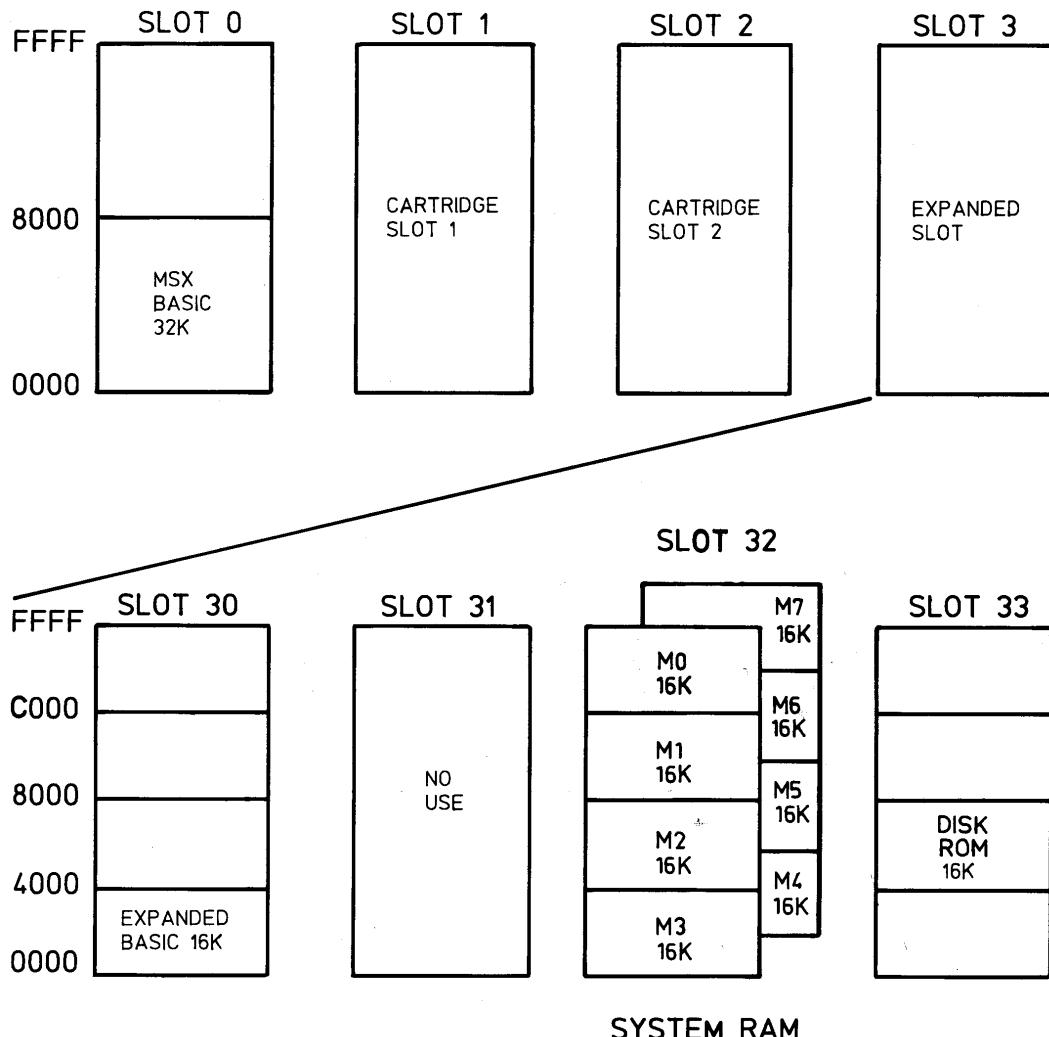
## FLOPPY DRIVE

		
U106	Complete drive	4822 693 91114
U107	Complete drive	4822 693 91114
	Alignment disk	4822 395 30274

## CONTROL UNIT

		
U105	Complete unit	4822 219 81061
		
D501-D503	Green LED	4822 130 80345
D504	Orange LED	4822 130 80344
		
VR501	1k variable	4822 100 20631
VR502	10k variable	4822 100 20629
VR503	50k variable	4822 100 20628
<b>VARIOUS</b>		
SW501	Source select switch	4822 273 20277
SW502	Reset switch	4822 273 20276

## MEMORY LAY-OUT



### SYMBOLS USED IN CIRCUIT DIAGRAMS

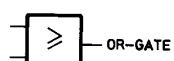
SYMBOL	TYPE	$t_{70^\circ\text{C}}$	TOLERANCE	SERIES
	SFR16T	0.5	1E - 3M 5%	E24
	SFR25H	0.5	1E - 10M 5%	E24
	MRS25	0.6	1E - 1M 1%	E24
	MR30	0.5	1E - 1M 1% (2%)	E24
	VR37	0.5	220K - 33M 5%	E24
	PR37	1.6	1E - 1M 5%	E24
	VR68	1	100K - 68M 5%	E24
	MRS 16T	0.4	10R - 100K	E24/E96

SYMBOL	TYPE	VOLTAGE DC	TOLERANCE
	POLYESTER FLATFOIL	SEE NOTE	10%
	PLATE CERAMIC	SEE NOTE	DEPENDING ON CAPACITY
	ELCO MINIATURE SINGLE	SEE NOTE	-10+50%
	ELCO SINGLE ENDED	SEE NOTE	±20%

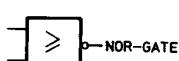
#### NOTE:

*	$f = 25V$	$q = 200V$	$x = 1000V$	$E = 20V$
	$g = 40V$	$r = 250V$	$z = 1600V$	$F = 35V$
$a = 2.5V$	$h = 63V$	$s = 300V$	$A = 1.6V$	$G = 50V$
$b = 4V$	$j = 100V$	$t = 350V$	$B = 6V$	$H = 75V$
$c = 6.3V$	$l = 125V$	$u = 400V$	$C = 12V$	$I = 80V$
$d = 10V$	$m = 150V$	$v = 500V$	$D = 15V$	
$e = 16V$	$n = 160V$	$w = 630V$		

39 301 A13



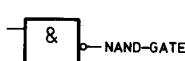
OR-GATE



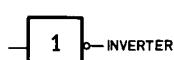
NOR-GATE



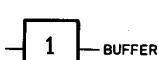
AND-GATE



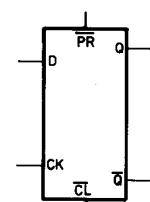
NAND-GATE



INVERTER



BUFFER



FLIP FLOP

36 570 A12